AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Established 1902

Volume 59 Number 2

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JOHN C. GOURLIE, Managing Editor
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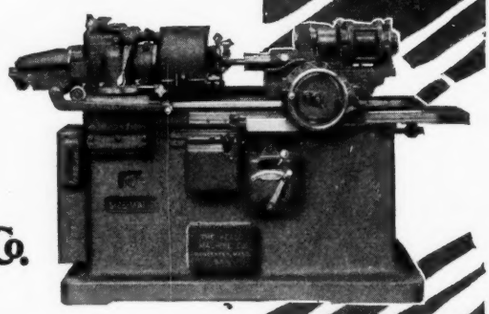

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G.M. Canada Builds Half-Million Cars

OSHAWA, ONT., June 30—Marking a milestone in the history of Canada's automotive industry, the half-millionth Canadian-built General Motors car rolled off the assembly line at the Oshawa plant of General Motors of Canada this month. Production of the 500,000th car followed closely upon a month in which it is reported, all monthly, weekly and daily records for production, shipments and sales were decisively broken. Two General Motors of Canada plants—one at Oshawa, the other at Walkerville—failed to catch up with orders.

"It has taken 20 years for General Motors of Canada to attain the half-million mark," pointed out J. H. Beaton, general sales manager. "While it took us more than 16 years to produce the first quarter million cars, the last quarter million has taken less than four years to make."

Gisholt Entertains Foremen

MADISON, WIS., June 30—The Chicago superintendent and foremen's club of the National Metal Trades Association was the guest of the Gisholt Machine Co. June 23. Short talks were given by Gisholt executives on equipment and trade practices.

Santiago Seeks Truck Bids

WASHINGTON, July 5—The Department of Commerce announces that the municipality of Santiago, Chile, will open bids for 87 trucks of 1½-ton capacity to be used for street cleaning service in that city, immediately.

Auburn Locates K. C. Branch

KANSAS CITY, July 2—H. S. Lowe, president of Auburn Distributors, Inc., has sold his company to the Auburn factory and Kansas City will become a direct factory branch.

Coming Feature Issue of Chilton Class Journal Publications

Oct. 10—Marketing Annual for 1929—Motor World Wholesale.

Cleveland Sales Increase for June and First Half

CLEVELAND, July 3—Marked increase in sales of new and used cars in June compared with the corresponding month in 1927, was reported by Herbert Buckman, Cleveland Automobile Manufacturers' & Dealers' Association. New passenger car sales totaled 4402, compared with 4022 for June, 1927. Commercial car sales were 345, against 272 in June, 1927. Movement of used cars was 14,493, compared with 13,059 for the same month last year.

New car sales for the first half of 1928 totaled 20,932, while the six-months' record of 1927 was 20,080. Used car sales for the corresponding periods were: 1928—69,936; for 1927—67,059.

Dealers report low stocks of both new and used cars.

Fort on Export Trip

SAN FRANCISCO, July 5—James H. Fort, vice-president of Fageol Motors Co., Oakland, has left this city on a foreign trade tour which will take him to every port on the Pacific, including the South Sea Islands, and from which he will not return until the end of June, 1929, and may remain away for a year from that date. He will visit the Pacific coast ports and commercial centers of South America, the Hawaiian Islands, Australia, New Zealand, the Dutch East Indies, the Philippines, China, Japan, and the Straits Settlements.

Thompson to Build $750,000 Additions

CLEVELAND, July 5—Thompson Products, Inc., will spend $750,000 for factory additions in Cleveland and Detroit to take care of production schedules which are outgrowing the company's present capacity.

The first of three new Cleveland units costing $500,000 is now under construction and will be operating by Sept. 1. The remaining two Cleveland units, to be erected during 1929, will be devoted to machining and heat-treating.

A contract has also been let for the first of two Detroit units which will be especially equipped for large production orders of drag links and tie rods. The second Detroit unit, to be put up in 1929, will house a battery of forging machines and two oil-fired boilers.

Mr. Thompson estimated that completion of the company's building program would increase the capacity of the two plants 35 per cent to 50 per cent. He gave evidence for the need of this by citing production and sales records of the company during the past few years. The total number of pieces turned out by the Cleveland plant for original equipment and replacement during 1927 showed an increase of 56 per cent over 1925, and production for the first six months of 1928 is 82 per cent of all of 1927, the company's biggest previous year. Gross sales figures show proportional increases.

Replacement Sales Increase

Records of the replacement division alone indicate a still greater growth, with 1927 gross sales over three times those of 1925. The first six months of 1928 increased 74 per cent.

Sales in 1926 at the Detroit plant increased 22½ per cent over 1925, and 1927, 33 per cent over 1926. The first six months of this year are 50 per cent better than the same months of 1927.

Calendar of Coming Events

SHOWS

American Electric Railway Ass'n, Public Auditorium, Cleveland..Sept. 22-28
American Road Builders Association, Inc., Cleveland Auditorium..Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-13
American Welding Society, Commercial Museum, Philadelphia.....Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Berlin .....Nov. 8-18
Brussels .....Dec. 8-19
*Chicago, National, Coliseum..Jan. 26-Feb 2
International Aeronautical Exposition, Grand Palais, Paris....June 29-July 15
Leipzig .....Aug. 26-Sept. 1
London, passenger cars .....Oct. 11-20
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York, National, Grand Central Palace .....Jan. 5-12
Paris, passenger cars .....Oct. 4-14
Paris, trucks .....Nov. 15-25
Prague .....Sept. 1-9
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 9-16
Salon, Automobile Salon, Inc., Hotel Commodore, New York .....Dec. 2-8
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco...Feb. 23-Mar. 2

*** Will have special shop equipment exhibit.**

CONVENTIONS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Gear Manufacturers Association, Statler Hotel, Buffalo, N. Y., Oct. 11-13
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American Welding Society, Commercial Museum, Philadelphia.....Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
National Association of Automobile Show and Association Managers, Before-Shows, Drake Hotel, Chicago .....July 26-27
National Safety Council, National Congress, New York .....Oct. 1-5
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3
Society of Industrial Engineers, Rochester, N. Y. .....Oct. 17-19
World Motor Transport Congress, Rome .....Sept. 25-29

A. S. M. E.

Cincinnati, Oct. 22-25 — Machine Shop Practice.
Cleveland, Sept. 17-20—Fuels.

S. A. E. National

Chicago, Aeronautic Meeting ....Dec. 6-7
Detroit, Book-Cadillac, Production Meeting .....Nov. 22-23
Detroit, Book-Cadillac, Annual Meeting .....Jan. 15-18
Los Angeles, Aeronautic Meeting, Sept. 13-14
Newark, Robert Treat Hotel, Transportation Meeting .....Oct. 16-18
New York, Annual Dinner, Hotel Astor .....Jan. 10

RACES

Belgium .....Aug. 12
Germany .....July 15
Great Britain .....Sept. 22
Italy .....Sept. 2
Spain .....July 29

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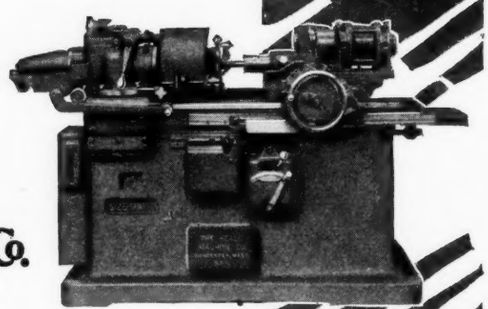

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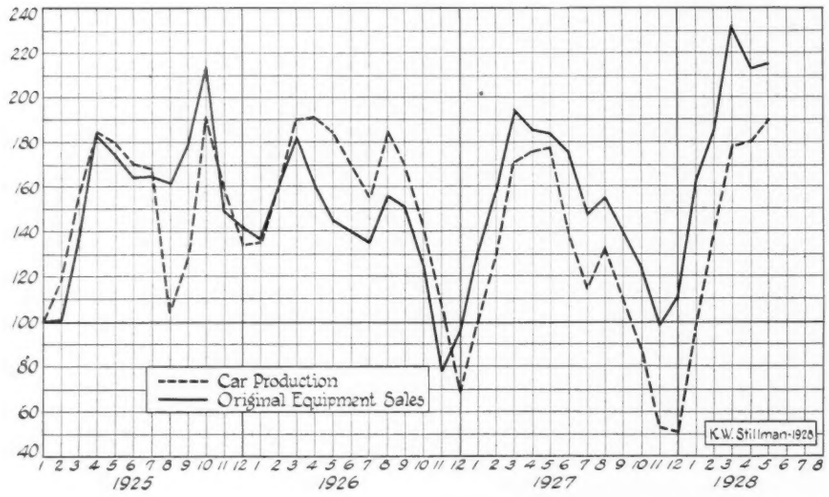
Car Production and Original Equipment Sales
(Index Numbers—January, 1925—100)



might pull sales away from higher-priced lines. It is possible, though not probable, that increasing Ford output will seriously cut into the market for his nearest competitors in price.

There are numerous evidences, furthermore, of generally active production, through the third quarter at least. The estimate of freight car requirements by the companies exclusive of Ford for the third quarter is 21 per cent over the actual requirements for the corresponding period a year ago. Although these estimates are naturally subject to some changes, and although the status of driveaways may seriously influence the indicated production, the confidence in the outlook maintained by most of the manufacturers is unmistakably indicated.

Chevrolet has announced a minimum production program of 100,000 vehicles a month through the third quarter, and the General Motors units are seldom far wrong in their forecasts of the market.

Original Equipment Shipments

Of particular significance is the high rate of original equipment shipments as shown by the index number covering this type of business of the Motor & Accessory Manufacturers Association. A chart presented herewith compares the original equipment index with an index of motor vehicle production similarly based on January, 1925, shipments as 100. The notable point is that variations in original equipment shipments in the last two years have generally forecast the movement of production, as well as very closely correspond to the curve of the production index.

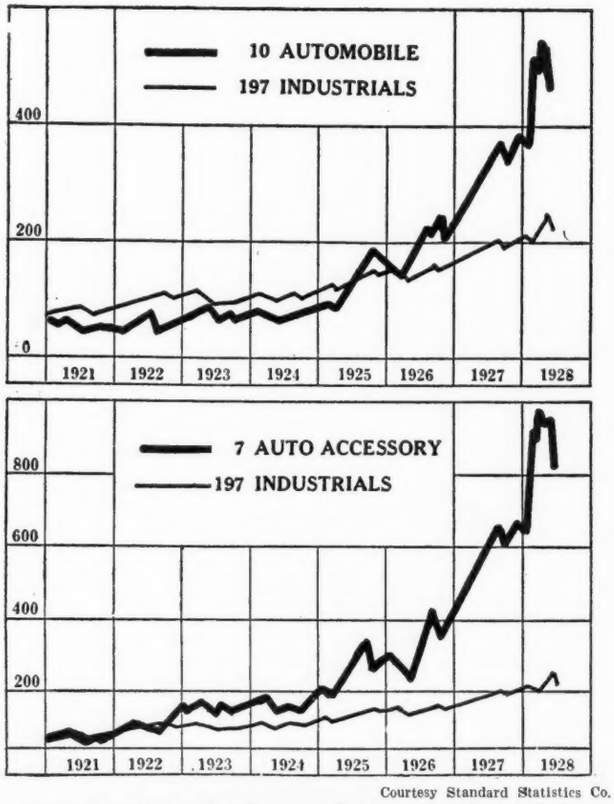
Due to the many possibilities of error, particularly as the M.&A.M.A. index is based on dollar volume rather than units, the manner in which the real trend has been established through the 3½ years of the original equipment index is most gratifying. It appears that the index ought to be accepted as a real forecaster, and the current indication is for a maintenance of high production levels.

The first half year's sales are not so readily appraised as is the production situation. Retail movement started very slowly in the first three months, being considerably below the corresponding periods of 1927 and 1926. Here again it is necessary to refer to Ford, since the early production of the Model A was almost entirely for the purpose of stocking branches and dealers with the minimum of display and demonstration jobs. With allowance for this condition the first quarter did not compare unfavorably with a year ago.

In April and May sales surged upward to new records for many companies, while retail deliveries of Fords began to be a factor. June showed less than the usual seasonal recession and deliveries cut heavily into the accumulation of stocks in dealers' hands.

In the first five months of the year, U. S. production of passenger cars, less U. S. exports, was 1,450,955, this being the total available for domestic consumption. Domestic sales in this period may be estimated at around 1,270,000 vehicles, leaving net additions to dealers' stocks of 180,000. If this calculation is correct, the stocks at the end of the period, in view of the Ford situation, must be regarded as very moderate, and, as already noted, they were probably materially reduced in June.

Used cars were particularly burdensome in the early months but the active retail market for cars has aided materially in disposing of stocks, even if many losses were incurred in the process. At the outset of summer the dealers still have too many cars but just now is perhaps the best time to dispose of the second-hand vehicles. Late spring and early summer is the best time for used car campaigns under factory auspices, for then there is good demand for vacation touring purposes and better prices can be obtained than later on. Another used car crisis will



Courtesy Standard Statistics Co.

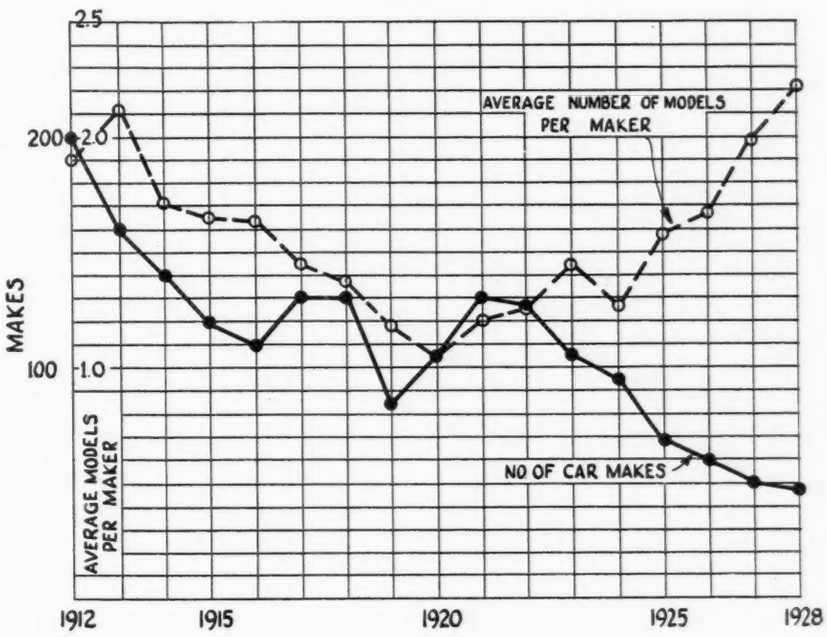
Security prices, showing trend of automotive and industrials preceding and following recent market break

be faced in the fall unless strenuous efforts are made now to dispose of surplus stocks.

Exports more than ever before were a powerful sustaining factor so far as production was concerned. Despite negligible overseas shipments of Ford cars, exports from the United States in the first five months totaled 158,268 cars and 47,899 trucks, against 138,961 cars and 47,934 trucks in the corresponding period a year ago. Thus the situation of some months back has been reversed; then cars were barely holding their own in foreign business while trucks were gaining.

In the domestic market, trucks in the early months were selling rather below last year's marks, although recently there have been real signs of a major recovery. The lighter vehicles have made a particularly strong showing and the outlook is considered favorable. Buses are selling somewhat better than last year, but will have to record some more gains before the situation can become satisfactory to the producers.

Car Models Per Manufacturer, 1912-1928



One sure sign that passenger car business has been eminently satisfactory is the fact that several producers abandoned plans for introducing new models at this time. The need for special sales stimulus for the summer season was evidently not felt, and the new models that were brought out were by factories who customarily make their changes at the end of the spring selling campaign.

Many of the reports of additional lines to be put out by leading factories proved unfounded. For some time the tendency to add extra lines for dealers to handle has been quite pronounced, as may be seen from the chart covering models per manufacturer, but something like stabilization appears to be nearing in this respect. A few more additions are to be expected, but not many. Truck lines are being added more frequently than passenger car lines.

Ford Gap Nearly Filled

The gap created by the reduced state of Ford operations in the early months of 1928, as compared with the corresponding period of 1927, was almost entirely filled by the record-breaking output of the other manufacturers of low-priced cars. Production of all cars with wholesale prices under $500 was about 622,000 in the first five months this year, against 657,000 a year ago. Ford production accounted for about 113,000 of the output to June 1 this year, against 317,000 in 1927.

This showing is the more remarkable in view of the fact that many thousands have withheld buying cars because their orders were in for Fords and they were willing to wait. Ford undoubtedly lost a good deal of business, but there is ample reason to believe that even if he had been able to establish very large quantity production his nearest competitors in price would still have been able to sell more cars than they sold a year ago.

Especially does this appear true from further analysis of the output by price classes. Cars in the $500 to $1,000 area gained in the first five months about 142,000 units, the total this year being approximately 798,000. The proportion of gain was about 21.8 per cent. There has been, therefore, a very emphatic and significant demand for low-priced cars, and the gains extend far enough up on the price scale to make it appear that the low rate of Ford output has held down total production rather than merely favoring Ford's nearest competitors.

Not less interesting is the manner in which the lower priced vehicles have gained at the expense of those immediately above. The important class ranging from $1,000 to $1,250, showed a reduction in the first five months of nearly 29 per cent, the figure for the first five months being about 130,000. Still higher up on the price scale there are numerous variations but apparently no significant tendency is in evidence. The upper-medium and high-priced cars have at least held their own.

Expressed in percentages, production for the first five months was apportioned as follows:

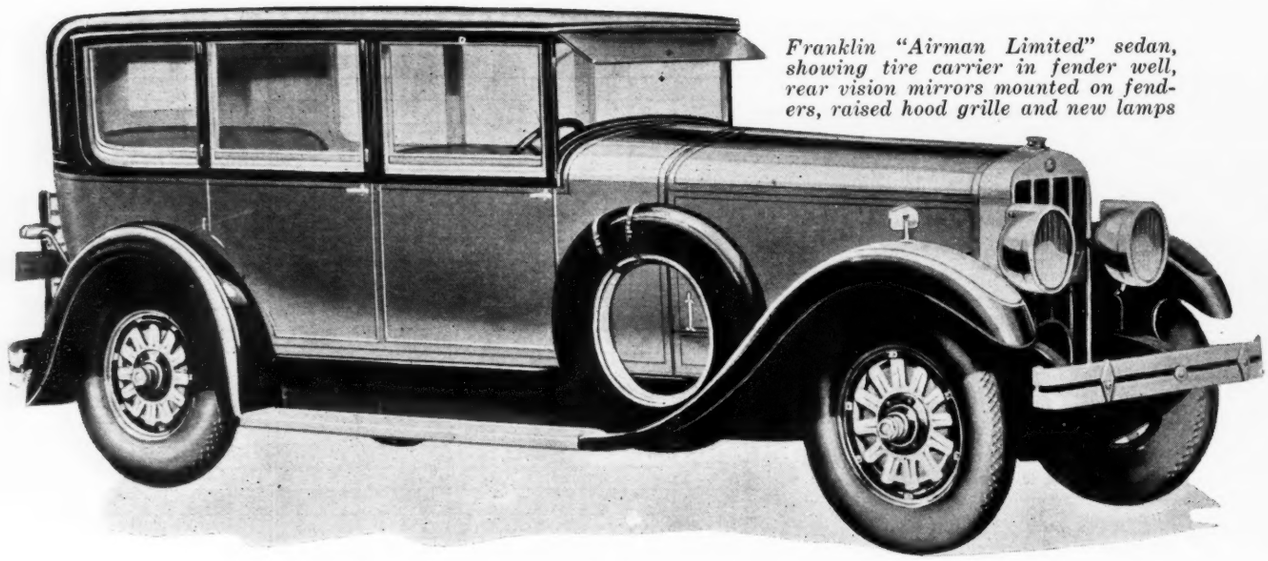
	Under $500	$500-$1,000	Over $1,000
	%	%	%
1928	37.0	47.5	15.5
1927	40.6	40.5	18.9

Although the indicated shifting of demand may be only a temporary phenomenon it seems to be worthy of particular attention, since to some degree the same situation was observable last year.

The current restraint upon credit continues to dominate comment on the general business situation. It is recognized that a prolonged period of higher interest rates would place burdens upon business that would probably be reflected in lower volume of sales. Our own industry would be directly affected in that finance companies would have to charge higher rates for their services in connection with instalment sales of automobiles.

It is widely believed, however, that easier money is in sight, now that the pressure of mid-year settlements is over and some of the towering volume of loans on stock collateral has been liquidated. The Federal Reserve Board has been manifestly determined to check speculation, and once this object is

(Continued on page 49)



Franklin "Airman Limited" sedan, showing tire carrier in fender well, rear vision mirrors mounted on fenders, raised hood grille and new lamps

Franklin Announces *Airman Limited* With Body Refinements

Compression ratio also slightly increased and metric spark plugs adopted. Vacuum booster added to fuel feed system. Prices are reduced $25 to $75.

THE new series of Franklin cars, known as the Airman Limited, shows only minor changes in chassis design, while a good many changes have been made in body details and appointments. Prices are slightly lower than those which have ruled heretofore, the reductions ranging from $25 on the 119-in. wheelbase Oxford sedan with wood wheels, to $75 on the convertible coupe on the same chassis with the same wheel equipment. The new line with prices is as follows:

119-in. Wheelbase

	With Wood Wheels	With Six Wire Wheels
Sedan	$2,790	$2,865
Oxford sedan	2,790	2,865
Sport sedan	2,910	2,985
Victoria brougham	2,760	2,835
Coupe	2,625	2,700
Convertible coupe	2,850	2,925
Chassis	2,000	2,075

128-in. Wheelbase

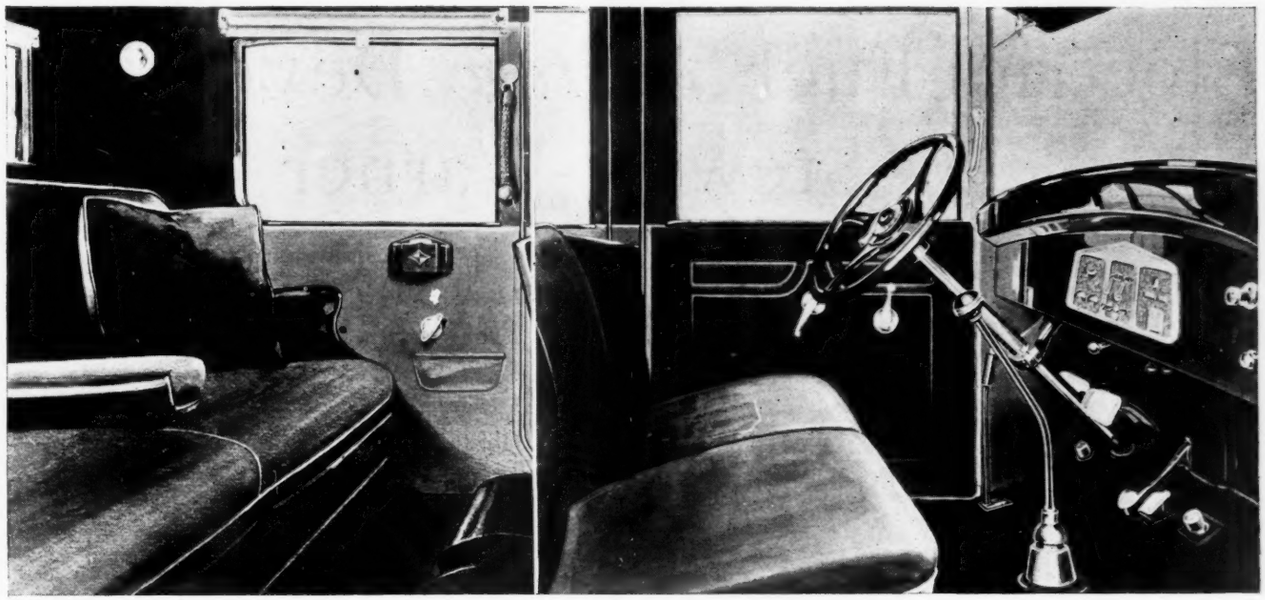
	With Wood Wheels	With Six Wire Wheels
Sedan	$2,980	$3,055
Oxford sedan	2,980	3,055
Limousine	3,080	3,155
Sport runabout	2,975	2,975
Sport Touring, 5-pass	2,975	3,050
Touring, 7-pass.	3,060	3,135
Chassis	2,050	2,125

The fuel feed system has been improved by the provision of a vacuum booster; a Stator air cleaner is now furnished as regular equipment, which has the advantage of silent operation under all conditions, and metric spark plugs are fitted on account of their reduced thread size and consequent better cooling facilities. The compression ratio has been slightly increased. The exhaust pipe covering is now of molded asbestos, instead of the sheet asbestos previously used.

Broadcloth is used for the upholstery of all closed models, the material used being Australian wool stock with a heavy body and a satin-like finish. Tufting has been eliminated, smooth cushions and backs, relieved by piping and with welted seams, being now used. All rear seats now have a folding arm rest, which makes them comfortable for two persons when the arm rest is dropped down and affords room for three when it is folded back.

Floss-stuffed pillows, covered with material duplicating the upholstery and set off by edgings of contrasting colors, are included among the standard equipment furnished with all closed models. Foot cushions have taken the place of the more conventional foot rail. Wilton carpets are furnished in both compartments, and are trimmed and bound to fit and extend up over the seat box, no metal being exposed to view in the rear compartment.

Door frames are covered with cloth to match the upholstery. The dash is concealed behind a panel covered with muleskin. A finish of inlaid mahogany is used on the instrument board. Shirred pockets are provided on the back of the seat in the five-passenger model, and pockets for packages in the seven-passenger models just ahead of the rear cushions.



Interior views of Franklin Airman Limited sedan

In the closed models the vanity includes an attractively designed shopping list, which also carries a beveled mirror and a white gold cigarette case and ash receptacle, these being mounted in a mahogany case decorated by a shaded parquetry. There is also an electric lighter with a 36-in. cord, combined with ash receivers. A corner light of new design supplements the regulation dome light. Each car is furnished with a robe of fleece made by the Shannon Mills of Ireland.

The appearance of the hood shell has been improved by increasing the height of the grille panels and reducing the nickeled area on the top section. A plaque with scroll design bearing the Franklin motto ornaments the hood shell. The headlights have been raised 2 in. and the license bracket also is carried higher than formerly. Rear vision mirrors are carried on both fenders. Nickel silver binding is used on the running boards and is so applied that no screw heads are visible. Channel rubber covering is used for the running boards.

Spare tires—either one or two, according to the choice of the individual purchaser—are carried in side wells on the sedan, seven-passenger touring, limousine and sport runabout models, while in other models a spare tire is carried at the rear. Either artillery wood wheels or wire wheels are furnished, the list price varying with the wheel equipment.

Folding trunk racks, which proved quite popular when introduced on the Franklin custom-built de luxe bodies, are now standard equipment on all models. These are assembled with full-bar rear bumpers. A Trico automatic windshield cleaner is furnished as standard equipment on all models, as well as a North-East speedometer and a Jansen watch with Swiss movement, these latter two items being mounted on the instrument board.

Chrysler Specifications for Rubber

IN the absence of standard specifications for rubber to be used in such parts as engine mounts, spring shackles and body shims, the engineering department of the Chrysler Corp. some time ago developed a specification for this material. Following are the requirements:

Physical:

a. Tensile strength, 3200 lb. per sq. in. minimum (lengthwise of grain).
b. Elongation, 600 per cent minimum.
c. Permanent set after tensile break and after recovering period of 10 minutes, 35 per cent maximum.
d. Hardness on durometer in Chrysler laboratory, 50 maximum (Penetrometer, 60 maximum).
e. Flow Test; a disk ¾ in. in diameter and ¼ in. thick shall be subjected to a pressure of 600 lb. per sq. in. between polished steel plates for 24 hours at a temperature of 180 deg. Fahr. At the end of this period and after the disk has been at room temperature for 30 minutes, the maximum permanent set shall be 20 per cent of its original thickness, and with only a slight distortion in shape.
f. Compression Test: A disk ¾ in. in diameter and ¼ in. thick shall be subjected to a pressure of 4000 lb. for 1 minute at room temperature. After the pressure has been released for 10 min., the maximum permanent set shall be 5 per cent of its original thickness and there shall be no break on the circumference.

Chemical:

g. Rubber Hydrocarbons, 65 per cent, minimum.
h. Total Sulphur exclusive of sulphates, 2.50 per cent maximum.
i. Zinc Oxide, 10 to 17 per cent.

Parts made of this material shall be of first-class workmanship. The surfaces shall be smooth and free from pit marks or rough spots. Corners and edges shall be clean cut and free from fins or other defects.

Purchases by the Chrysler Corp. of rubber for parts other than tires run about $1,500,000 a year.

TWENTY-FOUR per cent of all trucks now in service in this country are registered in towns under 1000 population and in rural areas, according to R. L. Polk & Co.

Electric Fuel *System* Developed *by* Stewart-Warner

Elements consist of carburetor, magnetic pump and regulator. Offered in three different combinations. Vacuum and mechanically-operated systems also announced.

By A. F. Denham

IN an earlier issue details were given of the new direct feed fuel system offered by the Stewart-Warner Speedometer Corp. This system, while probably of the greatest interest and incorporating the most radical departures, is only one of eight offered by this concern with a view to being in a position to

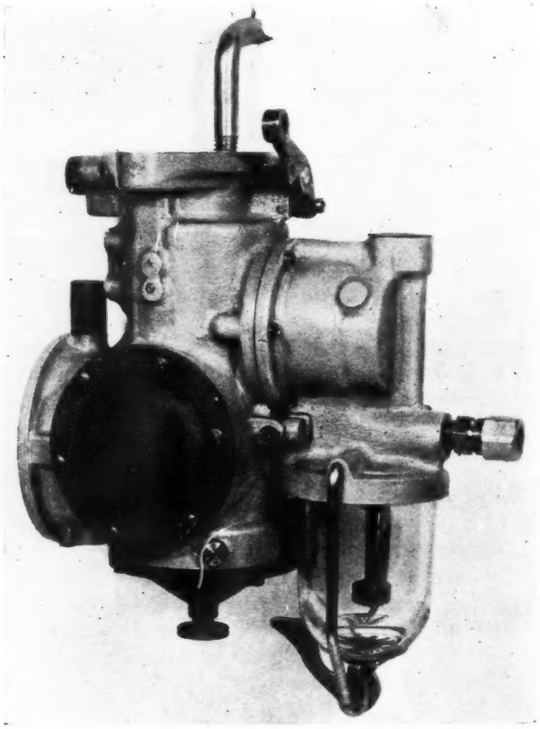


Fig. 1—Single-unit fuel system combining a carburetor, a magnetic fuel pump and a pump controller

supply the needs of the automotive industry for any type of fuel feed desired. In addition to the direct feed system it also offers:

1. A self-contained system incorporating in one unit a carburetor, a magnetic fuel pump and a pump regulator.
2. A variation of this system having the carburetor and pump control in one unit and the pump itself located in the gas tank.
3. A further variation with all three units separated, the pump in the tank, the regulator on the dash, and capable of using any carburetor.
4. A standard system using a mechanically operated fuel pump which is operated from the camshaft.
5. An improved vacuum tank type of feed.
6. The vacuum tank system supplemented by a vacuum booster mounted either on the intake manifold or on the tank itself.
7. A combination of vacuum tank and vacuum pump, the latter driven from the camshaft and effective only at low manifold vacuums to supplement tank action.

Each system has specific advantages. In principle both vacuum tank and mechanically operated pump systems are no longer experimental. The first three mentioned are unique, however, in that they are electrically operated. There have been some objections in the past to engine driven pumps on the ground that they cannot function until the engine has been started. The electrically-operated and controlled systems, on the other hand, can be and are made to function immediately on the turning on of the ignition switch. It is also claimed that the electric plunger pump will function better in cold weather than the diaphragm type. In addition, the electrically-operated and controlled pump is a true accessory, in that it does not require building into the engine.

Taking the first of the three systems that use the

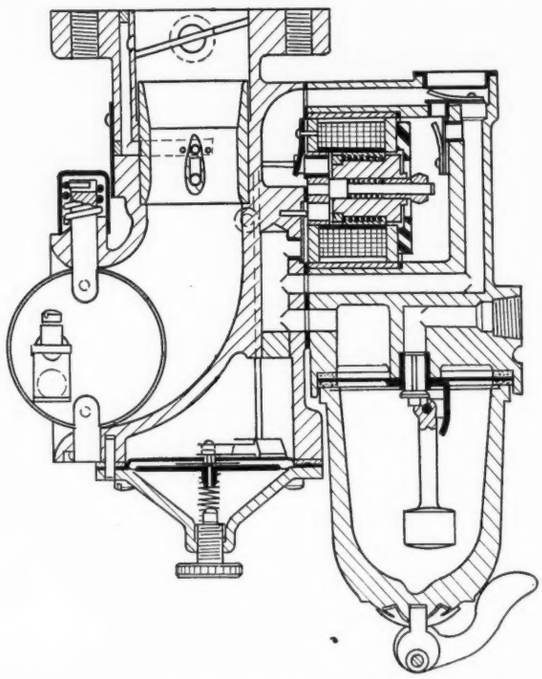


Fig. 1-A—Vertical section of single unit system, through carburetor and pump axes

electrical pump, that of the self-contained unit, its advantages are stated to be compactness, reduction of labor required for installation, and lower cost than for the mechanically operated pump system, especially when necessary engine changes are taken into account. The reason for using an electric pump in the self-contained unit rather than a restriction to bring the fuel to the carburetor is that the latter tends to choke the engine. A vacuum operated pump, moreover, would require too large a diaphragm for efficient operation

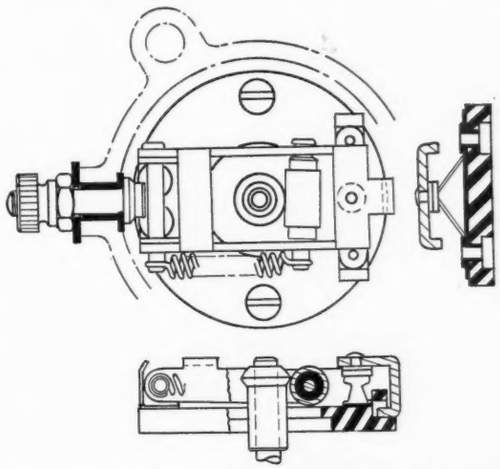


Fig. 1-B—Details of cam mechanism and electrical contacts

with the low manifold inlet vacuums available at full throttle.

Coincident with the development of the self-contained unit a new carburetor was developed by Stewart-Warner, which has a fixed diaphragm in place of the usual float valve, the diaphragm being controlled by a column of fuel above it. With the built-in electric pump this diaphragm is made use of to control the action of the electric pump by making it open and close an electric circuit. It is claimed that with this design much closer regulation of the fuel level can be obtained. The only thing which can affect the regulation in the system is wear of the contact points, which causes an increased movement of the diaphragm. This wear is said to be

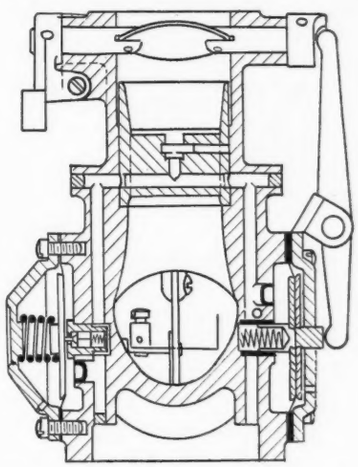


Fig. 1-C—Vertical section of single unit system, through carburetor axis

almost negligible. Temperature and friction do not enter to any extent.

The pump itself is of the magnetically-operated plunger type. The plunger is composed of magnet iron fitted with bakelite rings, alternate rings fitting the plunger shaft and the brass sleeve in which the plunger rides, thus forming a self-adjusting seal. By this means the necessity of grinding or fitting any metal parts to close limits is eliminated, reducing the cost. To assemble the rings on the plunger, a metal packing ring is pressed on. Reference to Fig. 1-A will make the design clearer. Pressed onto a pin pressed into the plunger at the outer end is a hardened cam whose function it is to trip the pump circuit. A hardened roller riding on the cam is shown in Fig. 1-B. In the normal position this circuit is closed. When the diaphragm in the carburetor closes the main circuit, which is in series with that of the pump, the magnet core is energized and draws the plunger in against spring tension. The cam finally trips the circuit open and the plunger returns to normal position again, closing the pump circuit. The circuit breaker mechanism is mounted on a bakelite disk for insulation.

The pump itself is of the double-acting type. All pump valves are of the flapper, spring-seated type, very light in operation. At the inner end of the pump it will be noted that holes are drilled through the plunger stop. The inlet valve at the bottom is mounted on the pump mounting carburetor flange, and the outlet on the pump casing. Operation of the other side of the pump is quite similar, both the inlet and the outlet flapper valves being located on the pump housing (see Fig. 1-A).

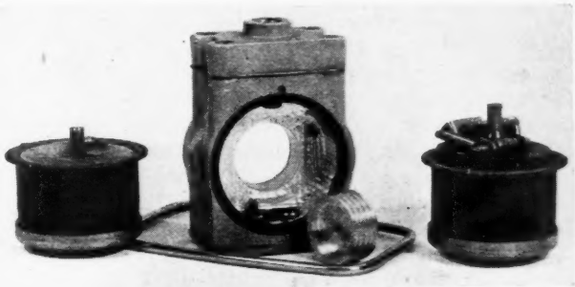


Fig. 2—Parts of pump for Systems Nos. 2 and 3, for mounting inside the fuel tank

The capacity of the pump is about 17 gal. per hour, and the priming pull of the plunger is about 3-3½ ft. with the pump dry and a normal clearance of 0.004 in. for the bakelite rings in the sleeve. This should be ample, since ordinarily there is a supply of gas in the strainer located immediately below the pump.

This strainer incidentally incorporates another feature, in that a weight is hung within it which, under sudden brake application, closes the poppet valve admitting fuel to the strainer, thus preventing stalling of the engine through the surging forward of fuel into the carburetor. For this purpose it is designed to overbalance slightly the column of liquid fuel in the pipe line from the gas tank. Naturally the pump valve springs cannot be made heavy enough to stop the fuel under this condition, since doing so would reduce the efficiency of the pump.

As will be noted from Figs. 1-A and 1-B, the contact points for the electrical circuit are located in compartments containing fuel. This might lead one to expect a considerable fire hazard. Stewart-Warner engineers claim, however, that they have been unable so far to fire any combustible mixture by means of these breaker points. This is probably due to the fact that, although the kick voltages may run up to 50 to 60 volts (the circuit operating on 6-volt battery current) which in turn

might mean high spark temperatures, the small separation of the contact points (about .006 in., new) and small size of arc seem to limit the total heat sufficiently so that the arc cannot set off a combustible mixture. Of course, this would apply to the most dangerous situation, a partially empty unit. Under normal conditions, with gasoline in the system, there will be only an infinitesimal spark, and, besides, there is then no combustible mixture in the neighborhood of the points, due to the absence of air.

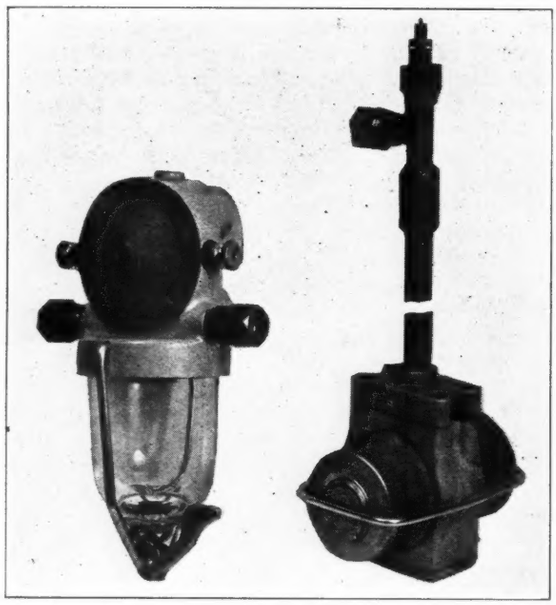


Fig. 3—Pump and control unit for three-unit electric control system

It is claimed that the small wear on the contact points is due to—

1. Their operation in fuel, which keeps the points clean and cool, and prevents oxidation.

2. The type of contact point mounting which imparts a scrubbing action to the points. This tends to remove the small amounts of tungsten carbide formed and also helps to make the entire surface wear evenly.

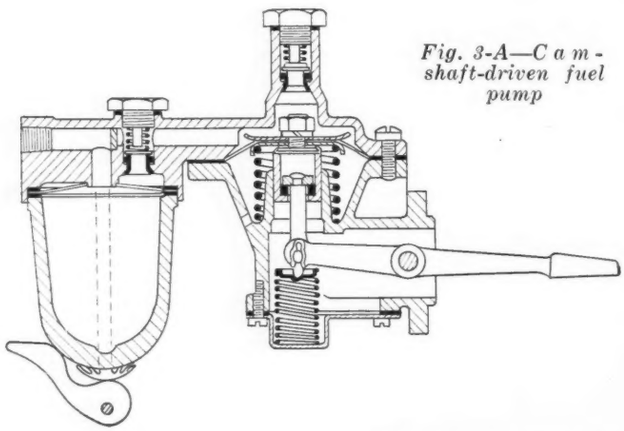


Fig. 3-A—Camshaft-driven fuel pump

3. The low current (0.6 amp. at maximum capacity, the current being proportional to fuel flow).

As has been mentioned, the latest type of Stewart-Warner carburetor is used in this unit. In this carburetor the air intake passage has been geometrically worked out to provide a symmetrical air flow through the venturi, thus distributing fuel evenly to the first branch of the intake manifold. It is claimed that with this design a 10-15 per cent increase in engine output is ordinarily obtained.

A second feature of the carburetor is the use in the venturi of a bridge (see Fig. 1-C) instead of the main jet. This bridge is stream-lined so as to reduce resistance to air flow. It is stated that with this design the liquid fuel spreads over the top edge of the bridge and comes off in the form of a plume, providing better atomization by more effective use of the entire airstream.

A third design feature, also shown in Fig. 1-C, is the provision of two accelerating pump diaphragms. In connection with these are used large free check valves connected to the riser chamber. Each chamber has a fixed orifice leading to the bridge in the carburetor throat. It will be noted that one of these diaphragms is operated by manifold suction through a passage to above the throttle valve. The other diaphragm is actuated by a cam on the throttle spindle. It does not come into action unless the throttle is open 15-20 deg. The reason for using both pumps is that a vacuum operated pump alone would provide maximum fuel flow for small accelerations, while the mechanical pump alone would not provide enough fuel for small accelerations.

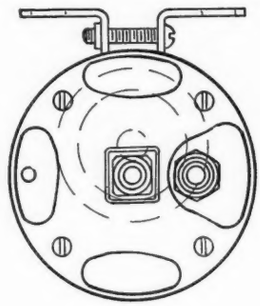
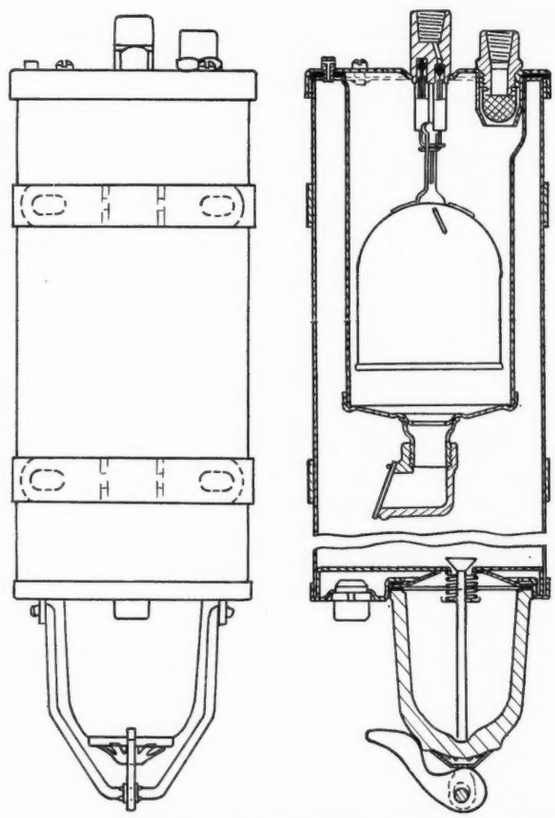


Fig. 4—New Stewart-Warner vacuum tank



Incidentally, the suction-operated diaphragm also operates the economizer through a small valve. The carburetor is also equipped with a fourth "jet" to provide a manual control if it is desired to enrich the mixture throughout the range of air speeds, as in warming up.

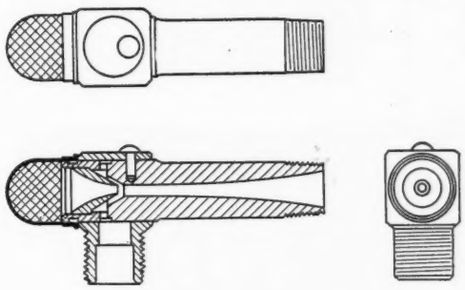


Fig. 5—Vacuum booster

It is brought into action by pulling out the choke button and remains in action after release of the choke button and closing of the choke valve, until a secondary dash control button, pulled out by the choke, is pushed in.

The second and third systems do not differ in operation from the single unit fuel feed. In both of these the pump is located in the gas tank at the rear. The design of the pump as a separate unit for such installation is shown in Fig. 2. The only difference between the two systems is that the first retains the electric pump control on the Stewart carburetor, while the latter permits the use of any carburetor through separate location of the pump control, which in turn is controlled by the carburetor float mechanism as with mechanically-operated fuel pumps.

The fourth unit offered is the mechanically-operated fuel pump. This does not differ in principle from similar designs on the market, being driven from the camshaft by an eccentric. Its variable stroke for the diaphragm is obtained by a "piston" (Fig. 3) pulling on the diaphragm in proportion to the back pressure from the carburetor float chamber. A leather cushion for the piston is provided to absorb the shock.

The new vacuum tank for system No. 5 also does not differ from the previous unit in principle. It has been designed for production at lower cost, however. One of the features is the elimination of all springs, which should make its operation more reliable. As shown in Fig. 4, the check valve to the outer chamber is extremely simple. It consists merely of a small fabric disk fastened on by a spring clip, the seat being on the metal rather than on the valve. Operation of the tank is by means of a float which has a brass plate of 0.050 in. thickness attached to it at the bottom for weighting, the float guide having been eliminated.

The tank is furnished either with or without integral fuel strainer. It is fastened on by means of a spring clip provided with an eccentric to lock it in place. This strainer, if furnished, is equipped with a shut-off valve so that the removal of the bulb for cleaning will divert the fuel flow directly to the carburetor.

Although it has been in use now for several months by a number of manufacturers, the vacuum booster mentioned in system six should also be included in the list of new developments. It is well known that in a number of modern engines, inlet manifold vacuums have fallen so low that vacuum tank operation is sometimes unsatisfactory, especially at the lower speeds with full throttle operation. To obviate this without resorting to mechanical or electrical means, the booster shown in Fig. 5 is offered. It is merely an injector admitting additional air to the manifold, the injector action increasing the vacuum at the tank, it is claimed, around 400 per cent at full throttle.

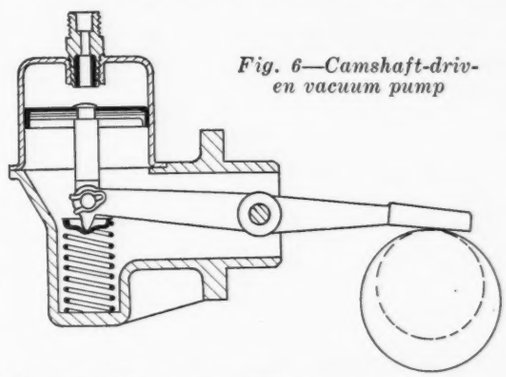


Fig. 6—Camshaft-driven vacuum pump

Optionally with this is offered the camshaft-driven vacuum pump mentioned in system 7. It makes possible the use of a smaller tank. The function of the pump is to maintain a definite minimum vacuum for satisfactory operation. As long as the manifold vacuum is above this point its operation has no effect, it being closed off by a check valve between it and the manifold vacuum outlet connection.

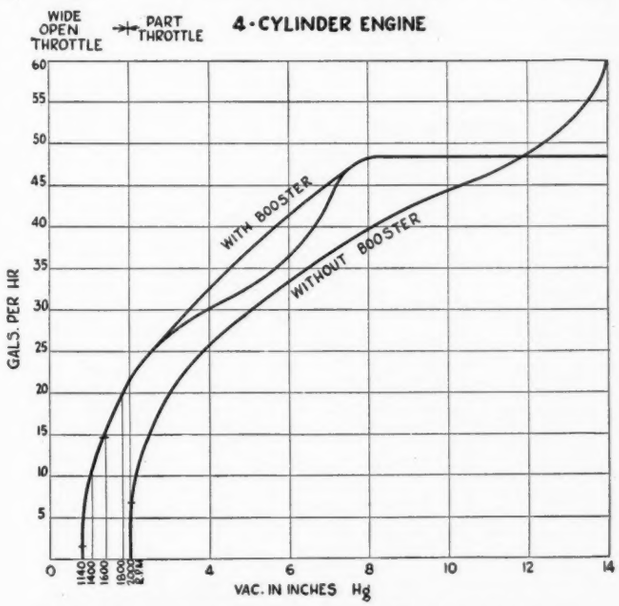


Fig. 5-A—Comparison of fuel deliveries of vacuum system with and without booster

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THE current flow in squirrel cage windings of the rotors of induction motors is analyzed in Bulletin No. 5 of the Engineering Experiment Station of the University of Minnesota, entitled "Turns and Phases in Squirrel Cage Windings," by George F. Corcoran and Henry R. Reed. The analysis is based on the hypothesis that two bars in the squirrel cage a pole pitch apart function as a single-turn coil, and they are not influenced in their functioning as a single coil by reason of being connected to all the other bars of the cage. This hypothesis is said to be proved by the fact that the actual flow of current in a cage bar as determined by means of the oscillograph is the same as the predetermined current and the reactance determined by measurement on a finished machine checks closely with the reactance calculated by means of formula derived with the hypothesis as a basis.

Truck Makers Asked *to* Tighten Up *on* Time Sales Credits

Associated General Contractors of America claim loose terms are hurting their interests by breeding competitors who are inexperienced and often irresponsible.

By Lewis C. Dibble

A MOVEMENT designed to induce truck manufacturers to tighten sales credits was given new impetus in Detroit, recently, when representatives of the Associated General Contractors of America, Inc., requested representatives of a number of truck companies to take such action.

Representatives of the truck companies met at the invitation of the contractors' association for the purpose of discussing several phases of motor transportation, especially as it deals with engineering construction contractors. The subject of credits, however, proved to be the most important topic to develop.

The discussions were divided into three classifications as follows:

1. Placing in the hands of both buyer and seller of motor trucks intelligent data concerning motor truck operation in construction haulage in order that motor truck operators, whether the contractor or hauler, will be assured of adequate hauling rates.

2. Definite action toward credit standardization, so that the construction industry may stand on its own legs and not in the future demand unreasonable credit from the motor truck or other industries.

3. Some standardization of sales policies without any references to price fixing, so that members of the construction industry may be assured of a square deal and thereby establish confidence between both industries.

S. M. Williams, former manager of the Autocar branch in Chicago and now manager of the engineering construction division of the Associated General Contractors, presided. Mr. Williams is well known for the work he accomplished in connection with organizing the commercial vehicle distributors and dealers of Chicago, who have so successfully taken steps to eliminate the large number of repossessions in the Illinois city.

Anxious to Cooperate

"We come to you in the spirit of wanting to cooperate in the elimination of conditions seriously affecting the interests of both the contracting and truck industries and their allies," Mr. Williams said, in opening the meeting. "They are the problems that require consideration of those in authority, and therefore, with the 1928 construction season already under way, we hope to avoid further delay in coming to an appreciation of the problems as they affect both industries, and to arrive at definite conclusions."

Probably one of the most graphic pictures drawn for the truck manufacturers to show how the excellent market for commercial vehicles which existed among contractors a few years ago has been greatly diminished as a result of loose credits, was drawn by Alan Jay Parrish, contractor from Paris, Ill., and president of the Illinois Municipal & Highway Contractors Association.

Feeling that their industry was slipping, the contractors of Illinois undertook a survey three years ago which showed that the contracting industry was in a greatly demoralized condition. Through the agency of loose credits many persons not experienced in the contracting business have been enabled to enter the industry. A majority of these operators, he declared, have proved the biggest menace to the contracting industry. Through their lack of knowledge they have persistently underbid on jobs with the result that it is difficult for an experienced contractor to exist. A majority of these inexperienced contractors have failed in their undertakings and truck and contracting machinery suppliers have suffered heavily from repossessions.

"Borrowing Certified Check"

"We found that contractors were borrowing a certified check," was a term used by Mr. Parrish in describing the credit situation. "Where contractors once took a great deal of pride in their equipment they now haul with their junkers, for it is their only means of competing with the inexperienced and irresponsibles who have bought their trucks for little or nothing down and who have been given long periods of time in which to pay for them.

"Three years ago Illinois contractors owned 75 per cent of their equipment. Now they only own 20 per cent because they can go out and hire others who have been set up in business through the agency of loose credits, for less than they can actually do the jobs themselves."

D. A. Garber, general manager of the A.G.C. of A., Inc., spoke briefly to say his association has no quarrel with credit nor does it want to keep small contractors out of the field. The association, he said, seeks to stabilize its business and the paramount requisite for accomplishing this is to eliminate loose credit practices on the part of truck and contractor equipment manufacturers and material suppliers.

During the discussions that followed, on how trucks are sold, W. W. Mitchell, of Reo., and R. L. Biggers, of Graham Brothers, cited the terms and conditions under which their equipment is merchandised. They, as was also A. M. Pearson, of Federal, were of the

opinion that some standardization of terms would be beneficial, and they all indicated they were open for some constructive proposals.

Want Manufacturers' Aid

Whether the manufacturer should seek to control the credit situation or whether it would be better to solve the problem by working with truck distributors and dealers, produced considerable discussion with Mr. Williams, of the contracting association, offering the following remarks: "We believe the manufacturer is under obligation to point out to his organization the conditions that exist. What we are trying to do is bring about a self-consciousness on the part of the manufacturers that they have an obligation to this (contracting) industry. When the manufacturers decide upon a policy they will find the contracting association ready to fight for it 100 per cent. The contracting industry does not want the truck, the contracting equipment manufacturer or the contracting supplier to carry his burden. Naturally we realize that credit has been a great thing for this nation. Without it we would not have been able to expand and accomplish nearly all the things that we have. All we have done so far is cry on each others' shoulder. What we need is action," said Mr. Williams in conclusion.

A set of resolutions were presented by the Chicago truck distributors' and dealers' association but no action was taken on them. It was suggested by Mr. Garber that the resolutions were of such a nature that they could not be complied with by the contracting industry.

R. E. Page, Jr., president of Autocar, feels that a standardization of credit in the truck industry would be helpful. "I can assure you we are trying to bring this about, not for the purpose of helping the contractors but so that we can make money," said Mr. Page, declaring that if truck manufacturers continue to sell vehicles on loose terms as in the past they face the probability of eventual ruin.

"We have no desire whatever to sell anyone a truck who cannot pay for it," Mr. Page continued. "We are in business to make money and cannot make money by doing business with those who do not have money." In conclusion he said the truck industry has stood around in the past and in many instances has financed irresponsible customers with a result that they have eliminated as buyers many old and reliable companies.

F. R. Bartlett, representing Pierce-Arrow, said that his company has found it almost impossible to standardize terms because of the various conditions existing. His company, he said, will welcome some solution to the problem.

Some excellent suggestions were made by Col. Fred Glover, president of the Timken Detroit Axle Co. "It seems to me this condition can be helped materially," he said. He pointed to the excellent work that has been accomplished in the Chicago territory by the Chicago distributors' and dealers' association and he suggested that a duplication of the Chicago association in various large centers of the country would do much to relieve the situation. "I doubt if it can be worked out nationally," he said. "I believe if associations could be formed in all the principal cities throughout the country that you would stand a reasonable chance of accomplishing much good." It was Col. Glover's suggestion that a national bureau be formed to assist in correlating the work of the various local groups.

Contractors pointed out that one of their biggest problems in bidding on a job is to determine the basis on which they should estimate their operating costs. They indicated they would welcome ideas from the truck industry which would tend to stabilize costs on a sound basis.

After an interesting cost study had been presented by A. H. Hunter, engineer of the Illinois Association of Highway and Municipal Contractors, which had been worked up by one contractor from carefully kept records covering a three-year period, discussions disclosed the fact that it would be almost impossible to compile any set table for determining hauling costs. The reasons for this are the varying factors which must be considered in each individual contract. The principal factors which enter into such a problem are road conditions, length of haul, type of equipment to be used for the work, and handling facilities.

While nothing definite came of the Detroit conference, especially in the matter of credits, the discussions indicated a keen interest in the matter of loose credits and it was stated by Mr. Williams that a similar meeting will be arranged at a later date at which time efforts will be made to have a larger representation present from the truck manufacturers. Besides the Detroit meeting, the contractors' association invited contractor equipment manufacturers to meet in Chicago, where they also were requested to take steps to eliminate the granting of loose credits.

Those representing the truck industry at the Detroit meeting were: R. P. Page, Jr., president, Autocar Co.; P. F. Minnock, Chevrolet, of Chicago; George P. Anderson, director of sales engineering, Dodge Brothers, and R. L. Biggers, director of sales promotion and development, commercial car division, Dodge Brothers; A. M. Pearson, transportation engineer, Federal Motor Truck Co.; O. E. McCarthy and F. R. Bartlett of Pierce-Arrow; Col. Fred Glover, president, Timken Axle Co.; Glenn W. Poyzer, Selden Truck Corp.; W. W. Mitchell of Reo, and W. A. Madigan of the Motor Truck Distributors' Corp., Chicago.

New Book on Brakes

BRAKE maintenance has become a very important branch of car maintenance generally, as is evidenced by the fact that in the larger cities quite a few firms now specialize in it. The brakes count among the wearing parts of a car and must be relined at intervals, and it is also in the interest of safety that they be inspected and tested at intervals by competent persons.

In order to do effective maintenance work the mechanic of a garage or brake service station must be familiar with the operating principles and methods of adjustment of the different designs of brake. To impart information along this line is the object of a book by Paul Dumas, just published by the Chilton Class Journal Co. It deals with fundamentals of brake maintenance, elementary adjustment, application of lining and trouble shooting. All of these chapters are well illustrated. Then follow chapters on the various proprietary systems of brakes, the Lockheed, Bendix three-shoe with shaft control, Bendix brake with lever control, Westinghouse Vacuum brake, Timken hydrostatic brake and Steeldraulic brake. The latter part of the book is given over to instructions on the maintenance of brakes on practically all of the makes of passenger cars now on the market. The book is printed in large, readable type, and particular care has been bestowed on the illustrations.

Watson Introduces New *Stabilator* With "Rubber Flow" Action

Power range is increased from 2½ to 1 to 18 to 1, thus giving adequate control of rebounds under all conditions. New braking material has long life, eliminates "grab."

By C. Edward Packer

NEW principles of design are involved in the development of the Watson Rubber Flow 18 to 1 Stabilators. Not only is the internal construction of these Stabilators a pronounced departure from that of their predecessors, but the material from which the braking member is made is new. It was only after the development of this new rubber-like material, from which the Stabilators get their name of Rubber Flow, that John Warren Watson decided to produce an even better rebound braking mechanism than existed in the former types.

This rubber-like material provides a "flowing" action over polished steel surfaces. It is free from any inclination to grab, stick, bind or freeze to the steel surfaces. That this new "flowing" substance has remarkable wearing qualities was proved this spring in a 9000-mile test run through some of the worst sandy gumbo in the State of Oklahoma. The material used was inspected by the writer and the wear was found to be hardly discernible. The wearing surface had a slightly burnished appearance.

Next in importance to the smooth and consistent performance of the new Stabilator is the increase in power range between minimum and maximum spring deflection. The former range was 2½ to 1. The result was that if the "1" setting was light enough to give free action on the road, the 2½ times greater power of the Stabilators was not sufficient to hold the car against rebound on big bumps. If, on the other hand, the 2½ was set so as to resist any and all bumps that might be encountered, the car would be hard riding on the No. 1 setting.

The new range, as previously mentioned, is 18 to 1. That is, if there is one unit of resistance when the springs are at rest, there is 18 times as much resistance when the springs are under maximum tension. With this stepping up of the power ratio, a soft, comfortable ride is obtained on smooth roads with ample Stabilator power held in check available to control rebound on the worst bumps usually encountered.

The housing of the new Stabilators used for front mounting are oval, while the housing of the new Stabilators used for rear mounting are round, as formerly. The characteristic control straps which have proved so satisfactory on previous Watson Stabilators are retained These straps, however, do not in any way contribute to the frictional or braking action within the Stabilator, but merely serve to actuate or set into motion the braking mechanism.

Steel Brake Still Used

As formerly, there is within the Stabilator a steel brake. Coiled about this drum is the brake lining, made of the newly devised rubber-like compound. When the car springs are at rest, this lining is practically free from contact with the drum. Not only is the area of braking surface reduced, but the pressure per unit area between the lining and the steel drum is at a minimum. Just how this pressure is reduced will be explained later. As the car spring is deflected and the strap is allowed to be drawn into the Stabilator by the coil spring within, the brake lining increases its area and pressure on the drum. This action is so proportioned that the influence of a 6-in. deflection of the car spring will increase the resistance of the Stabilator 1800 per cent.

New Watson Rubber Flow 18 to 1 Stabilator

This exceptional power range is influenced to a great extent by the mounting of the coil spring in the Stabilator. This coil spring serves a double purpose. One is to bring the brake lining instantaneously into action with the drum so as to follow spring deflection. By so doing the resistance to rebound is applied before the car has had a chance to start on its upward bounce. As the natural inclination of a coil spring when being wound is to work to one side or "flood," this flood action has been used to give a light, free, easy ride to the Stabilators when the car is operating on good roads. This coil spring is carried in a

circular bracket that is so suspended that it is free to move from side to side. As the car is at rest and the Stabilator strap is drawn from its housing, the coil spring within the Stabilator is under maximum tension. As a consequence the "flood" of the spring is at its limit, with the result that the circular member within which this spring is carried, comes in contact with the rubber-like braking compound, thus diminishing its resistive force. As the car spring is deflected the tension on the coil spring within the Stabilator is released so that its influence on the braking member is removed.

Rubber Flow is merely the name given by John W. Watson to the principle involved in creating the new riding action of the Stabilator. The name was prompted by the material from which the braking compound was developed—rubber—and its smooth or flowing action on the steel drums.

The new Stabilators are available in three sizes—small, medium and large.

Ray Day Aircraft Piston

ANNOUNCEMENT is being made by the Ray Day Piston Co., manufacturers of aluminum alloy pistotns for original equipment and replacement for automobiles, buses, trucks, etc., of a new type and design of piston especially adapted to the needs of aircraft engines.

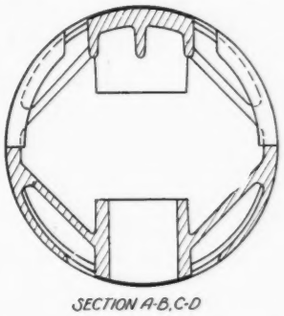
While replacement pistons will be manufactured for such engines as the Liberty and OX series, the primary intention is to supply the original equipment market. The outstanding feature of the one-piece piston is that its skirt expansion can be completely controlled through specific design, making it possible even to obtain a negative skirt expansion with a positive expansion of the head, without distorting the skirt in any manner.

This is accomplished by taking advantage of higher head than skirt temperatures. The piston head is cut away from the skirt as in the standard Ray Day piston. Two trusses extend downward from the outer diameter of the head to connect the piston pin bosses to the head. From each of the pin bosses, ribs, which are part of the piston casting, connect the bosses to the two slipper skirt halves.

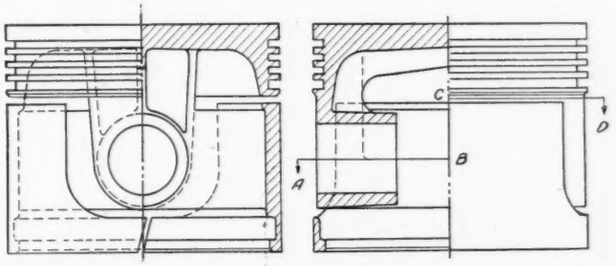
When the head expands under heat, the bosses will move outward, ribbing being provided to prevent deflection of the connecting supports. The bosses in turn, through the ribs to the skirt, will tend to pull the slipper section inward to offset the normal expansion of the skirt. For example, assume a temperature rise of the skirt were such as would normally cause an expansion of 0.008 in. (straight aircraft piston) and the temperature rise of the head were such as to cause expansion of 0.016 between the points between the pin bosses. It will be seen, by referring to the drawing, showing the 90 deg. angle between the skirt ribs, that the 0.008 in. greater expansion of the head would just nullify the normal skirt expansion, and its clearance would remain unchanged.

Moreover, the action of the skirt ribs on the two separate slipper skirt-halves is such as could not produce any appreciable distortion of the skirt, and the full bearing area should be maintained. It is stated that the piston is ordinarily designed so that the approximate clearance of the skirt is about 0.001 in. per inch of bore.

It is claimed that piston weights correspond very closely to those of the solid skirt type in use at present in production aircraft engines. The use of four rings per piston is recommended as a minimum to assure low head temperatures, especially with air-cooled engines.



Ray Day aluminum alloy piston for aircraft engines



With four rings it is claimed that any possible objection to the separated head and skirt construction is overcome, the rings carry away all the necessary heat.

Regarding the special aluminum alloy used by Ray Day, it is stated to have a tensile strength of 45,000, a Rockwell hardness of 80 on the B scale, and a specific gravity of 2.80. It is close grained, and is claimed both to be absolutely free from porosity and also to have high heat conductivity.

Automotive Prosperity

(Continued from page 39)

accomplished there should be no shortage of funds for commercial operations.

Among the automotive manufacturers, high output and sales have been accompanied by earnings that give every indication of exceeding last year's by a substantial margin.

The industry as a whole, in fact, has been a model of stability and sound policy, a condition reflected in the mounting prices of automotive securities up until the time of the recent break in the market. This bidding up of the stocks had a much more solid foundation, in current earnings and prospects for the year, than did the speculative gyrations in most other market groups.

Earnings for the equipment group for the first six months, when the figures are out, should be the best in several years. For these manufacturers also, the generous volume of business has not been attained by the sacrifice of adequate per unit profits. Better sales policies and more cooperation between buyers and sellers of the industry are having highly beneficial effects.

The accompanying charts on security prices of the automotive groups, reprinted by permission of the Standard Statistics Co., Inc., show the trend of prices preceding and following the market break. Although a few of the automotive stocks suffered rather severely in the selling wave, prices in the main continued well above those obtaining around the first of the year. Many market observers believe that any substantial recovery in the averages will be led or participated in very heavily by the automotive group.

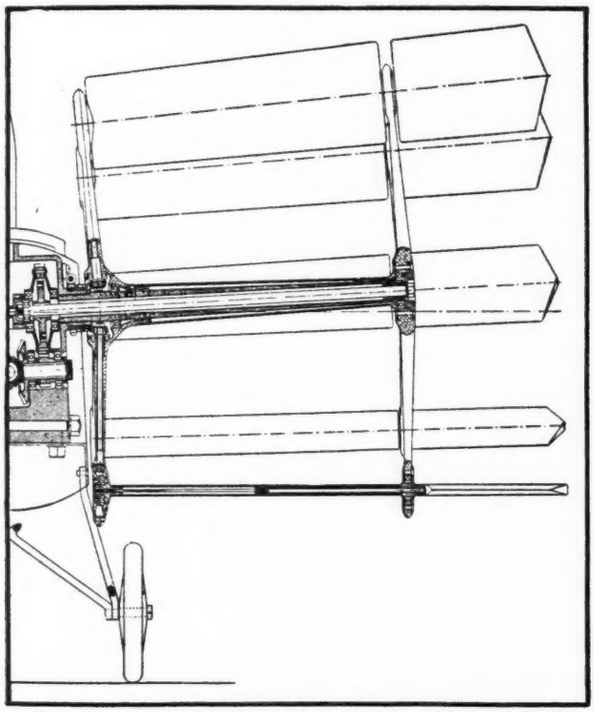
Cycloidal Propulsion *is* Described *at* Detroit Air Meeting

New method is applicable both to airships and airplanes. Other technical flying problems discussed at two-day meeting of A.S.M.E. Aeronautic Division

By P. M. Heldt

A TWO-DAY aeronautic meeting at the Book Cadillac Hotel, Detroit, on June 28 and 29, under the auspices of the Aeronautic Division of the American Society of Mechanical Engineers, served as a prelude to a series of aeronautic demonstrations and contests all of which either started from or took place in Detroit. These included the Fourth National Air Tour, the Gordon Bennett international balloon races, the glider exhibitions by German pilots and the Boys' National Model Airplane contest.

In accordance with a practice that has grown up in connection with technical meetings, the papers presented at any one session of the aeronautic meeting all dealt with closely related subjects. Thus the session on Thursday morning was known as the Transport Session. On Thursday afternoon there were two simultaneous sessions, the Wood Session and the Powerplants Session. On Friday morning there were again simultaneous sessions, the Design Session and the Airways and Airship Session. On Friday afternoon tours of inspection were made to the Ford Aircraft Factory at Dearborn and to the plant of the Airship Development Corp., where a new metal airship is being built for the Government.



Transverse section through machine with cycloidal propellers

A new method of aerial propulsion, applicable to both lighter-than-air and heavier-than-air machines, was described by Frederick Kurt Kirsten, Professor of Aeronautical Engineering at the University of Washington. It is known as cycloidal propulsion. As applied to a heavier-than-air machine it consists in the use of two propeller wheels, one on each side of the fuselage, at about the same points where the wings are usually located, these propeller wheels performing the functions of both the wings and the propeller of an ordinary airplane. Each propeller wheel has a number of blades, mounted on the spoked wheel in such a way that they can rotate around their own axes. By means of gearing, the propeller wheel is rotated around its axis, and each of the propeller wheel blades is rotated around its own axis at one-half the speed of wheel rotation. Thus, if the blade had a radial position when at the top of the wheel, it would have a tangential position when at the bottom of the wheel and in the top position it would produce a propelling effort while in the bottom position it would produce very little drag. As a matter of fact, the blade gearing is so adjusted that the blades come into the radial —the most effective—position shortly after having passed through the top position, so that both a propelling and a lifting effort is produced. These two components of the propeller force should, of course, be proportional to the drift and lift, respectively.

A comprehensive test of cycloidal propulsion was conducted for the Bureau of Aeronautics of the U. S. Navy. It is hoped that the test report to the bureau will be published in the near future by the Engineering Experiment Station of the University of Washington.

Gilbert Betancourt, a Detroit engineer who was formerly connected with the Aircraft Development Co., said:

"In the eyes of the world at large the present year of 1928 marks the beginning of remarkable progress of the airship era. Two British airships and one German, all larger and better than any heretofore built, are to be completed and launched for demonstration flights all over the civilized world within the present year; and a naval contract for two American Zeppelins of great size is soon to be signed, and construction will be started before the end of the year.

"No doubt the world-wide demonstration of the three

new European rigid airships will aid materially in clarifying the practical uses of airships. One serious handicap is the cost of manufacturing this type of aircraft. Either Germany or England can build a rigid airship for about half as much as we can at present, because this craft is still a largely hand-made product, and as yet machinery production methods have not been used. Our salvation will lie in expediting the development so that we can build our ships in groups of five or more from the same design, and of the same size."

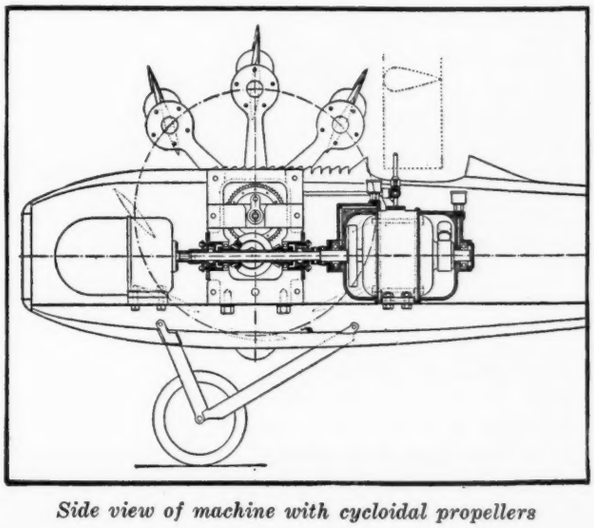
Paper on Gluing Wood

T. R. Truax, wood technologist of the Forest Products Laboratory, Madison, Wis., in a paper on Gluing Wood in Aircraft Work, said that previous to the World War the glues used in this country for making wood joints were mainly of the animal, vegetable, and fish classes, all of which are low in moisture resistance and therefore lose strength under continued dampness. Although not water-resistant, high-grade animal glues are still used in the manufacture of aircraft propellers, since an increase in moisture large enough to weaken the animal glue seriously would also make the propeller unserviceable on account of change in shape. Blood-albumin and casein glues are the water-resistant glues which have been used most in aircraft construction. Blood-albumin glues require heat to set them properly, and their use is therefore confined to plywood which can be made in hot-plate presses. Casein glues are used in the construction of spars, wing ribs, struts, curved wood members, and general assembly work. Casein glues have high water resistance and durability. They require no heat to set them, although hot-pressing improves their water resistance.

Brig.-General Wm. E. Gillmore, U.S.A., in a paper on Military Aviation said that aeronautical engineering lacks the past, the precedents and the tradition that are the heritage of the mechanical and civil engineer of today, so that we must build up our data as we go.

The army, in building up a foundation of engineering information for the designers, has destroyed in static test one each of every new design submitted, in order to prove by test that the engineering assumptions of the designers were fairly accurate.

The justification for going to the expense of destroying a complete airplane to prove an engineering theory lies in the fact that it has only been in the last few years that acceptable airplane structures have been completed on the first design.



Side view of machine with cycloidal propellers

Harold Caminez, of the Fairchild-Caminez Engine Co., Farmingdale, L. I., dealt with the Development and Technical Aspects of the Fairchild-Caminez Engine, in which a cam construction replaces the usual crankshaft. Although this engine works on the four-stroke cycle,

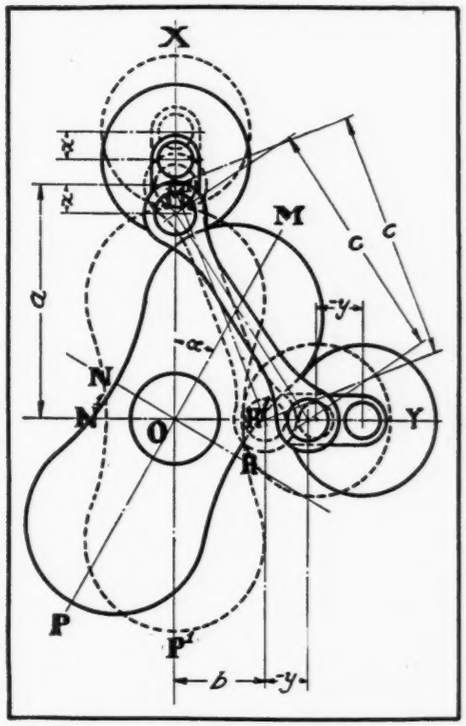


Fig. 1—Diagram of Caminez cam motion

the camshaft on which the propeller is mounted makes only a single revolution during the time of one engine cycle, which makes it possible to combine high piston speed with low propeller speed without the use of a separate reduction gear.

One of the most interesting design problems in the development of the engine was the determination of the proper profile of the drive cam. One of the conditions to be met is that there shall be no sudden change in the acceleration of the piston. Referring to Fig. 1 herewith, the cam quadrants MN and PR are so laid out that the piston motion inward will be in accordance with the following equations:

$$x = r\,[(1-\cos 2a)-k(1-\cos \beta)] \quad \ldots\ldots [1]$$

where x = piston travel from top center
r = ½ length of total piston travel
a = angle of cam rotation from top center
k = constant selected to suit cam-profile requirements, which for Model 447-C engine is 2.3, and
β = angle whose value is determined from Equation [2] following

$$\sin \beta = \frac{\sin 2a}{k} \quad \ldots\ldots [2]$$

The variation in velocity during the inward stroke of the piston is obtained by differentiating Equation [1].

$$V_x = r\omega\ (\sin 2a - \cos 2a \tan \xi) \quad \ldots\ldots [3]$$

where

V_x = piston velocity during inward stroke and

ω = angular velocity of cam

The variation in acceleration during the inward stroke of the piston is obtained by differentiating equation (3):

$$A_x = r\omega^2\left(\cos 2a - \frac{1\cos^2 2a}{k\cos^2\beta} + \sin 2a \tan\beta\right) \ldots [4]$$

where A_x = piston acceleration during inward stroke.

The quadrants RM and NP are such that the link length employed keeps the piston rollers in contact with this portion of the cam during the outward stroke. Referring to Fig. 6, it is seen that the following hold true.

$$a - b = s \ldots [5]$$

$$a^2 + b^2 = c^2 \ldots [6]$$

$$(a - x)^2 + (b - y)^2 = c^2 \ldots [7]$$

where a = distance of link-pin center from center of cam when piston is furthest out
b = distance of link-pin center from center of cam when piston is furthest in
s = length of piston stroke
c = length of piston connecting link
x = travel of piston in from top center
x = travel of piston in from top center
$-y$ = travel of piston out from bottom center, y being taken as negative to denote motion away from cam center.

The distance the piston moves outward on quadrant *RM* in relation to the piston motion inward on quadrant *MN* is therefore as follows:

$$-y = -b + \sqrt{c^2-(a-x)^2} \ldots [8]$$

The velocity of the piston during the outward stroke with relation to the velocity of the adjacent piston is obtained by differentiating Equation [8].

$$V_y = \frac{a-x}{b-y} V_x \ldots [9]$$

where V_y = piston velocity during outward stroke
V_x = velocity of adjacent piston at corresponding instant during its inward stroke.

The acceleration of the piston during its outward stroke with relation to the acceleration of the adjacent pistotn during its inward stroke is obtained by differentiating the preceding equation,

$$A_y = \frac{a-x}{b-y} A_x - \frac{1}{b-y}(V_x^2 + V_y^2) \ldots [10]$$

where A_y — piston acceleration during outward stroke and
A_x = acceleration of adjacent piston at corresponding instant.

The curves of piston travel, velocity, and acceleration versus cam angle shown in Fig. 1 were obtained from the preceding equations.

S. Albert Reed, of the Reed Propeller Co., New York, spoke on the Technical Development of the Reed Metal Propeller. The Reed propeller is an aircraft propeller with solid, thin and almost knife-like blades of forged or rolled duralumin, which alloy has about the same specific gravity as aluminum and the strength of mild steel. Such propellers made in a single piece have been manufactured in the United States by Mr. Reed and his licensee, the Curtiss Aeroplane & Motor Co., Inc., since 1921, and since 1923 two other companies have manufactured propellers having detachable blades of the Reed type which are anchored in a steel hub. Since 1923 Reed propellers have been made also in Europe, by five aircraft and metal concerns. The outstanding achievement in the development of the Reed propeller was not merely the substitution of metal for wood but a substantial improvement in the aerodynamic efficiency. The problem was to make a propeller with blades of thin sections which would not change their pitch, either permanently or in the character of oscillatory change or flutter, and this was accomplished in 1920 after several years' experience with models.

The centrifugal force of each blade of a 10 ft. propeller at 1800 r.p.m. is roughly about 15 tons at the hub. The thrust or pull of such a propeller driven by a 400 hp. engine is about 1000 lb. (i.e., 500 lb. for each blade). On account of the inherent rigidity, together with the restoring component of centrifugal force, the forward tip deflection in flight, due to thrust, is usually less than 1 in., either with a wood or a metal propeller.

The aluminum alloys used for Reed propellers are the following: Baush duralumin; Vickers duralumin; Duren duralumin; Aluminum Co. of America 25 S; Schneider & Co. (France), Alforium, and Metallbank und M.G. (Germany), A eron.

Slotted Wings Discussed

F. Handley Page of London, England, contributed a paper on Slotted Wings. He said that the use of wing slotting extends the limits of angularity within which aircraft may be safely flown and the original Wright control used, and at the same time the control is being so improved that the range of stalled flight in which the original control was and is of no avail, is made safe.

The inherent and fundamental difficulty of the breakdown of air-flow over the upper surface of a wing section—known as "burbling"—has, due to the stalling of a normal unslotted wing, placed a lower safe limit on the flying speed of an aircraft, and has likewise set a lower limit, below which, owing to lack of increased lift with increased angle, the aircraft controls cease to respond to the control movements of the pilot.

The increased range of angles at which lift can be obtained with the slot, is limited only in degree by the number of slots used. Its ultimate development must depend on mechanical considerations and it may well be that, with further mechanical experience, which is gained but slowly, larger numbers of slots will be used in a wing, particularly now that the fashion for their use has set in.

Two courses lie open to a designer in the application of the slot. The first and most obvious is to slot the wing throughout its span, and, as the range of angles is increased through which useful lift can be exerted upon the aircraft, to obtain a wider speed range and improved performance, provided that the mechanism added does not offset the advantage so gained. The second course is to apply the lot to a portion only of the lifting surfaces and to use the device mainly to give that control at and beyond the stalling speed of the aircraft which is lacking with the ordinary wing.

Mac Short, vice-president and chief engineer of the Stearman Aircraft Co. of Wichita, Kan., in a paper on the Design of Commercial Airplanes, said the designer must always keep in mind the need for high pay load and high speed. Weights must be kept down and there is evidently a ratio between the expenditure that can be logically made in order to save a certain amount of weight. It has been stated that aircraft contractors to the British Government expend as much as $10 to save one pound of weight, and one manufacturer in this country figures that from $1 to $2 per pound can be allowed.

Just Among Ourselves

Multiplicity of Models Creates a Problem

WITH half of the year behind, production seems to be going along at about the gait which was expected by the closer observers at the beginning of the year. The indications now are for a total output of cars and trucks of between 4,200,000 to 4,400,000—about the same as was predicted six months ago. A few optimists were talking about 5,000,000 vehicles being produced this year, but the habitual users of pencils, paper and statistics weren't in that group. Dealer stocks of new cars have mounted some even in the last month or two, but the big difficulty most retailers have been having is getting on hand the particular models they want out of the now very large variety being offered by almost every important manufacturer. The multiplicity of models which has become common in the last few years has brought to the selling organizations a very real problem which is far from being solved at the moment. A distribution of models not only to distributors and branches, but also to individual dealers, which will meet the demands of retail trade and at the same time fit in with a feasible manufacturing schedule is an almost impossible condition to obtain. Yet that is the very problem with which manufacturers are faced today; upon the degree of success with which it is solved will depend the financial success or failure of a good many dealers in the next few years.

* * *

What We Said Was, "Don't Pass the Buck"

AFTER making a 30-minute talk at the Quebec S.A.E. meeting about how engineers might improve their financial positions by thinking and acting in management and business terms rather than in purely engineering terms, we had the pleasure of hearing one prominent engineer—J. A. C. Warner, of Studebaker, to be explicit—get up and state that everything we had said in half an hour could be summarized in the single phrase "Don't pass the buck." That's the way with engineers; they may have inferiority complexes, but they certainly are good in shooting holes in other people's inflated egos. At any rate, Warner was 100 per cent correct. As a matter of fact, it was highly fortunate that he made the statement, because it called forth a subsequent one from Henry M. Crane which seemed to us worth the price of the trip. "During the War," Mr. Crane said, "a great deal was learned about the art of buck passing and finally an important fundamental principle was thoroughly established. This was that the buck could always be passed downward; sometimes sideways; but never under any circumstances upward."

* * *

The Spirit of Cabell in Modern Business

WE doubt if James Branch Cabell is a popular writer with the average business man. His subjects, his attitude of mind, his approach to life in general would seem to be about as far from the tempo of modern industry as the Phillies are from winning the National League pennant. And yet insofar as executives here and there have caught the spirit of Cabell —not directly in all probability, but from some one of a thousand hidden sources—business has taken on a new life, a new virility and a new inspiration. The successful man today, after all, is the one who somehow or other is capable of approaching every day as a new business adventure; who sees industry as a constantly changing panorama of hazily connected incidents through which runs some thread of partially understood continuity and who actually enjoys the fact that it is constantly changing and that complete, permanent understanding is impossible. Judged by practical business standards Cabell is a worthless and futile writer; judged by Cabell's standards—or better, perhaps, lack of standards—business is equally worthless and futile. The reason most of us fail to get out of many books and many people what they might have for us, as a matter of fact, is because we insist on exercising judgment during the process of contact. Absorption is possible only to a limited extent, while the mind is actively setting up the new ideas against its own previously conceived rigidities or standards. And only through emotional as well as mental absorption can the spirit of strange things be caught.

* * *

An Adventure in Human Welfare

SUBSEQUENT to writing these comments anent Cabell, we ran across a quotation from Rousseau which seemed of interest along the same lines. "A nation is not a mere aggregation of individuals," Rousseau said, but rather "an adventure in human welfare." Certainly modern industry is an adventure in human welfare if ever there was one, and it is those who are approaching their daily routine in that high spirit who are doing most to bring that adventure to something like a series of happy endings.—N.G.S.

THE FORUM

Aircraft Factory *Purchasing* Agent Has Difficult Job

His sources of supply for materials and equipment are limited and usually he is forced to buy in a seller's market.

Editor, AUTOMOTIVE INDUSTRIES:

I have read Norman G. Shidle's article on buying and selling practices in the automotive industry. Like every other industrial enterprise, the airplane factory has its peculiar problems in manufacture and consequently in the purchase of material and equipment.

The industry is comparatively young and its sources of supply are not as numerous as for a more established one. Especially in Government work, specifications are rigid and at present not many manufacturers of raw materials and special parts are catering to the trade. The purchasing agent is placed in a peculiar position, as he must buy at competitive prices, yet his field is often limited to one or two sources of supply.

Especially in military work, preliminary engineering is quite extensive and the time for manufacture and purchase of material is short, not allowing the purchasing agent to take advantage of the market. He also must obtain reasonable deliveries although he practically goes out and buys quite often in a so-called seller's market, and to buy at satisfactory terms under such conditions requires a special brand of buying psychology.

I do not believe that the manufacturers supplying material to the aircraft industry are taking undue advantage of their position. Although quantities of certain types of planes built in one lot are becoming larger, from a present day quantity production standard it is still very small; material is bought accordingly, necessitating short runs, subjected to a rigid test and often rejection. On the other hand, it is generally agreed that up to a certain point keen competition usually produces better methods, and consequently better quality and lower cost.

Quantities Will Get Larger

With the tremendous strides the industry is taking, it is a certainty that quantities will get larger, allowing for bigger runs of raw materials; more suppliers will enter the field with the result that the purchasing agent's buying psychology will automatically change. It will be a gradual transition, brought about by the old economic law of supply and demand. Although keen competition usually brings about wonderful results I am certainly not in favor of the cut-throat type. Practically everything has a saturation point and when such is reached the tables are turned, resulting in widely fluctuating prices, poor quality and general unreliability and waste.

Buying of equipment is with us a cooperative affair and is practically divided into two distinct classes. In the one class we group standard equipment of which we know the exact performance for a given job, including standard machine shop equipment on which replacements or additions are made. Usually in that case the shop specifies the machine, which may be a duplicate with late improvement of a machine already in use. The purchasing agent is then consulted as to existing prices, delivery and his general opinion on the request. With all buying data complete, the shop superintendent puts this in the form of a proposal to the factory manager whose approval paves the way for a purchase.

Price Only One Consideration

Price of course is one consideration, but not the most important one, and if a certain make of machine has given good service in the past, it receives first consideration, provided, of course, that it has kept pace with latest improvements. For one thing it fits in the general line-up, the operator is familiar with it and we know what to expect in service. A very important factor in the case of a battery of machines of the same make is the ease and economy in upkeep; wearing parts necessary for repair may be kept in stock and the millwright, due to his familiarity with the machine, can make changes in the shortest possible time. In case it becomes necessary to buy a standard piece of equipment for a newly created product or operation, the shop superintendent and the purchasing agent get together with the result that the purchasing agent goes over the field and submits a list of prices and deliveries. I believe it to be an accepted fact that in the case just described there is always a certain make of equipment that the shop has set its mind on. This may be caused by several things, such as the general reputation the equipment has with the trade, or someone in the organization connected with the selection may have used the same article elsewhere.

Should the survey made by the purchasing agent disclose some attractive buys, they are seriously considered, and if these buys are of a make we are not familiar with, the procedure is to find out where it may be seen

in operation; in which case a visit to the other plant is arranged by the dealer or manufacturer. I have made such visits together with the purchasing agent and others interested in the operation of the particular equipment and find that this practice has given astonishing results and has saved us considerable money. We have experienced cases where the equipment we planned to buy was not what we wanted at all for our work. Wherever such visits are made we are always given the required information in the most cooperative spirit and of course we have extended the same courtesy to others.

We now come to the other class of new equipment which we may call the experimental. Practically every new order for either military or commercial planes creates a demand for tools and equipment. Dies, jigs and fixtures we design and make ourselves. When a certain hand operation on a part or assembly due to quantity becomes sufficiently repetitive to warrant mechanical operation we call in the purchasing agent, show him our problem, with the result that he in turn calls for representatives of firms that most likely will be able to fill our needs. Especially in the case of portable tools we receive demonstrations and trials, and in that way we are able to receive the very best for the purpose. First consideration is always adaptability of the tools for the job in question, next is price, delivery and service.

Salesmen Are Praised

In most cases the patience, open-mindedness and helpfulness on the part of the dealers' representatives is admirable and we are indebted to them for many a good tool now in use.

The practice of seeing equipment in operation either in your own plant or elsewhere has several merits. The one point I particularly want to bring out is that it takes care of the human element, a factor to be reckoned with. Everyone connected with the use and benefits of the new tool, from the operator up to the executive, has a chance to voice his opinion and make recommendations; it is sold before you start and at the same time has passed to a certain extent through the experimental stage.

The purchasing agent and factory superintendent both receive loads of mail and many calls from tool and machine manufacturers and dealers. Everything receives due consideration, but it is impossible to go into detail investigation and research in every case. Some of the very large factories with a tremendous output no doubt find it advantageous to maintain a department for such research, but although we are by no means small as factories go, we cannot maintain such a staff; in fact, we could not even file all the advertising matter that comes in. However, we are always on the lookout for a better way and the general practice is to pass along to all interested parties any matter of vital interest to us either present or future. Reading matter of such nature is noted and commented upon and if no immediate action is considered, it is filed by the purchasing agent. The rest (and this is the unvarnished truth) goes in the waste basket.

In conclusion, I would state that where the product is highly technical, and I include the airplane in that classification, the engineering department is the place from where the purchasing agent must receive most help in the future. Simplification of design and standardization of parts and material for all models should continually be worked for, as it forms the foundation for efficiency in manufacture and ultimate low cost. The automotive industry underwent this evolution and the aircraft industry will undoubtedly follow along the same lines. In fact a fair start has already been made.

PETER N. JANSEN,
Superintendent of Airplane Division,
Curtiss Aeroplane & Motor Co., Inc.

Stability of Lockhart's Car

Editor, AUTOMOTIVE INDUSTRIES:

Because of the possibility of rebuilding Lockhart's car, as mentioned in Robert L. Cusick's article in *Automotive Industries*, May 12, 1928, I have looked up the Army Air Corps report on the wind tunnel test. I quote the following therefrom, Model "A" being the model of a car Lockhart had been driving previously, and Model "B," of the car in question:

"The directional stability of Model 'B' appears to be about the same as that on Model 'A.' The center of pressure of both models is ahead of the center of gravity, which means that the machine will yaw out of the wind and not into the wind. This tendency on Model 'B' becomes greater (that is, the automobile becomes less stable) when the wheels are pointed toward the wind. The stability could be improved by the use of a vertical fin, but this fin would have to be of an excessive size to produce any noticeable effect.

"The test on the front wheel of Model 'B' shows the wheel to be unstable. This is caused by the streamline of the wheel turning with the wheel. It would be better if this streamline were made large enough to allow the wheel to turn with the streamline remaining stationary. This feature will have to be corrected."

From the above it will be seen that the McCook Field engineers were somewhat worried about these matters.

In the first place the center of pressure on the model was well ahead of the center of gravity. This is roughly analogous to driving an arrow feather end first. At ordinary speeds the wind force is so small in comparison with ground friction that this is of little importance. At 200 miles an hour not only is the force enormous, but, due to roughness of the beach, there are times when both front wheels are in the air and the friction is absent.

Again, a study of Fig. 11 of the report shows that the wheels have a large rudder effect. At 200 miles an hour if the front wheels are turned 2 deg. there is an aerodynamic turning moment applied to the car of 360 ft.-lb. At 4 deg. this becomes 760 ft.-lb.; at 6 deg., 1200 ft.-lb., and at 10 deg., 2160 ft.-lb. The forces become much greater if the whole car is yawed at the same time.

The front wheels were also unstable. If they were turned slightly, aerodynamic forces were brought into play tending to turn them further. To counteract this tendency it is understood that a certain amount of caster effect had been put into the wheels through design of the steering gear. Attention must be invited again at this point to the fact that this caster effect only operates when the front wheels are on the ground.

The ratio of the steering gear was 20 to 1. Assuming a wheel radius of 1 ft., this would throw turning loads on the wheel amounting to 3 lb. at 2 deg., 6 lb. at 4 deg., 9 lb. at 6 deg., and 14 lb. at 10 deg.

In view of the above, I suggest that if it is intended rebuilding Lockhart's car, more attention be given to the aerodynamic problem.

R. S. BARNABY, *Lieutenant, (CC), U. S. N.,*
Assistant General Inspector of Naval Aircraft.
Wright Field, Dayton, Ohio.

Rearranging Plant Results *in* More Efficient *Frame* Production

Midland Steel Products Co. realizes important economies from new layout. Lines semi-automatic. Flexibility is a feature.

A COMPLETE rearrangement of the Cleveland plant of the Midland Steel Products Co. has recently been effected. An unusual feature is associated with this rearrangement in that the company, whose production for the last 10 years was 12,432,000 frames—representing, it is stated, 44 per cent of that period's total output—did not have in mind an increase in plant capacity.

Above — These two Hamilton presses are used for blanking, piercing and forming two side rails at one time. They are unusual in that the dies are located in the upper part, the dies themselves being built up of small standard sections set into lead alloy

The point of view taken by the company is expressed by Howard Kulas, secretary, as follows: "One of the pitfalls of modern business in the view of the Midland management is found in the building of huge plant capacity with attendant overhead expenses. If capacity is expanded beyond the range of probable profitable markets there is a consequent overstrain after volume without regard to an adequate price. It is this sort of situation, contributing to the present era of profitless prosperity, which the Midland management is bending its efforts to avoid."

In designing the new production lines there were kept in mind three underlying principles of manufacturing, these being (1) flexibility of productive facilities; (2) quick turnover of inventory, and (3) utilization of sufficient automatic machinery to keep cost at a minimum by avoidance of top-heavy and burdensome overhead investment. From the point of view of flexibility, which has become of great importance in the frame manufacturing industry, due to the rapidity of body changes, and in order to be prepared to meet those changes at the least possible expense, this company's new lines are semi-automatic.

Work is handled on these lines by means of monorail conveyor

Below—View showing the main riveting line in the background and the progressive inspection line in the right foreground

This view gives a good idea of the length of the main frame conveyor. The top floor of the building in the rear is the baking oven

tracks. The old method of grouping presses and other equipment according to types and sizes with accompanying handling back and forth has been entirely eliminated. Equipment is now grouped for a progressive movement of the parts as required by their design, in this respect following the progressive assembly lines of automobile plants with sub-assembly lines terminating at the correct point on the final assembly line.

With the rearrangement, which has resulted in the saving of one-third of the floor space previously required, although maintaining a production capacity of 10,000 frames per day, three frame lines are in use at the Cleveland plant. Two of these are devoted to the manufacturing of completely assembled frames and the third is for the making of complete sets of frame parts which are shipped unassembled to the automotive manufacturer who desires to assemble his own frames. Each unit is sufficiently flexible to permit the shifting of the jobs from one to the other with very little expense and delay. The adjustment delay incident to such a change is only a matter of two hours, according to officials. Naturally, since the lines can be changed quickly from one job to another, a rapid turnover of inventory and the elimination of large storage banks with their accompanying handling expense results.

Below—This view shows the automatic machine for loading frames on the main conveyor which takes them through the cleaning, painting and baking divisions and delivers them to the loading platform

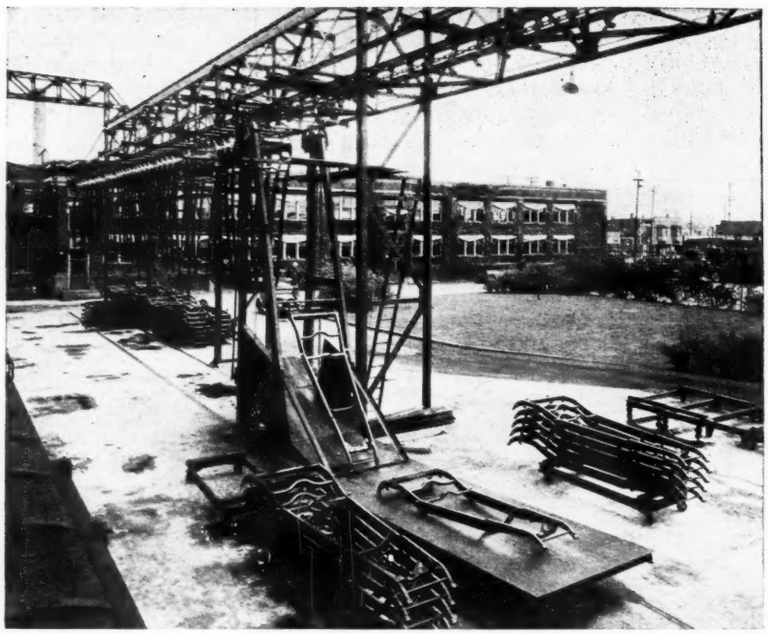
Above—An idea of the simplicity of the riveting installation is given by this web riveting machine. Note the spring balanced hangers

Steel is generally delivered direct from the freight cars to the pickling department without pre-storage, the shape of the steel, whether in plates, sheets, or hot rolled strips, depending on which is the most economical for the specific design. Much of the preliminary stamping is handled at the steel plant, to reduce shipping costs and scrap handling. The pickling department forms a separate unit, all steel being handled in acid resisting crates holding approximately seven tons each. After rinsing the steel sheets in tanks of soda ash solution, they are dipped in oil before removing from the pickle crates. This coating is provided to later eliminate labor of lubricating with drawing compounds except in cases of difficult draws.

From the pickle house the steel is delivered to the blanking presses in the line in which that particular job is being run. Each line is equipped with two Hamilton presses for making side rails. In the first they are blanked and pierced in pairs in one operation, all holes being pierced that will not distort during the forming operation.

An automatic conveyor takes the side rails from the press and delivers them to the forming press where they are again formed in pairs. A conveyor from this press carries the rails to racks at the head of the side rail assembly line. Of course there are two of these lines, one for the right and the other for the left side rail.

At this point the side rail is set on a cradle suspended from a carrier moving on a monorail track approximately 250 ft. long. Springs are used in the suspension in order to provide flexibility for handling the work during the riveting operations. Riveting presses are arranged along the conveyor line in such a manner that the various spring hangers, motor supports, brackets, etc., can be riveted to the rail without removing it from the cradle. These riveters are as standardized in design as possible to make them adaptable to any type of frame assembly. The heads are

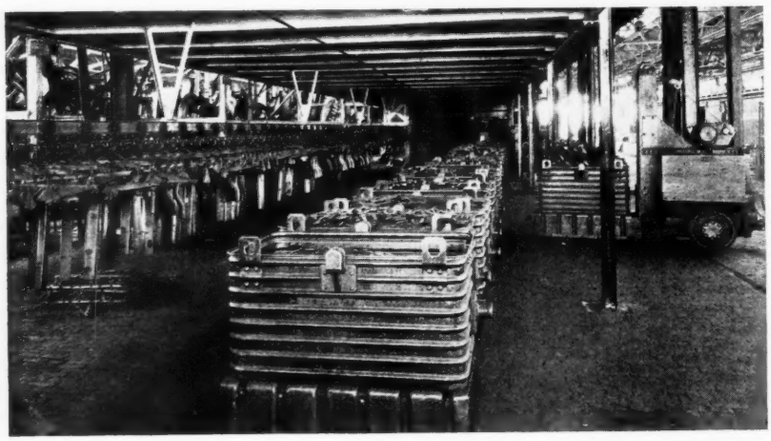


Automatic selective unloading machines mounted on tracks are used to remove the frames from the conveyor opposite freight car doors

pneumatically operated and exert a pressure of 20 tons. On completing the circuit of the riveters the completed side rail assemblies are placed on progressive assembly stands where the frame is "nailed" together through the use of special rivets which hold it together until it is riveted.

The "nailed" frame is then suspended from a second spring mount so designed as to provide instantaneous loading and unloading of a frame from the fixture. The design is also such that the frame can be turned or rotated to put it in any position required for riveting. All riveting, incidentally, is done cold, special heat-treated rivets being used for this work.

Riveting on the final assembly line is done by a series of Hanna riveters of the bulldozer type and of 20-ton capacity. The design of these machines makes it possible to get in the various angles, corners and radii formed by the frame design, making proper allowance for mill variations in steel.



Showing how finished frame parts, shipped unassembled, are loaded for shipment. The conveyor at the left has brought these parts to this point through the baking oven immediately above

The completely assembled frame on reaching the end of the conveyor is delivered to continuous inspection stands and then passes on to the platform for loading into the enameling unit. A special carrier made of steel tubing is here attached to the frame, using the spring hanger holes. The frame is then picked up by an automatic loading device consisting of two endless chains carrying dogs on which the carrier tube rests, the frame hanging in a vertical position. When it has reached the proper point a hook on the main automatic endless chain conveyor grabs the tube carrier between a collar at its center and conveys it through the washing, enameling and drying unit.

The cleaning, rinsing, drying and painting compartments are located on the first floor. The main conveyor, which is approximately 2400 ft. long, passes through these units, and carries the frames, which are suspended on it on 24 in. centers, up to a baking oven approximately 650 ft. long located on the roof of the plant. All of these units operate almost automatically. Temperature of the oven is about 400 deg. Fahr., and it takes about one hour for a frame to pass through it.

Leaving the oven, the conveyor makes a horseshoe circuit at the side of the plant over two loading docks between which are two spur tracks. This makes it possible to load from either dock, unloading machines being so arranged that selected frames can be automatically removed on one side of the loop with the balance passing around to the opposite dock. These unloading machines are similar to those used to load the frames on the conveyor with the operation reversed. They are mounted on tracks so that they can be placed opposite the door of the car into which the frames are to be loaded. A chute is provided on the unloader down which the unhooked frames slide to a flat table where the conveyor tube is removed.

The production line for the manufacture of frame parts that are shipped unassembled is located in a separate bay and is composed of two mechanical presses, one for blanking and piercing, and the other for forming, and a continuous side rail assembly similar to that used for the completely assembled frames. At the end of this assembly line an endless chain conveyor carries the parts automatically through washing, rinsing and drying chambers and then loops downward through a dip painting tank. Moving up but slightly, the conveyor then takes the side rails through a baking oven located 10 ft. above the floor, leaving working space underneath. At the side of this oven there are installed lines of presses to fabricate the smaller parts to be shipped with the unassembled frames. A separate conveyor is provided to handle these parts, which also passes through the same clean-

ing, rinsing, drying, painting and baking units used by the side rails. The smaller conveyor emerges from the oven near the point at which it was loaded, and the space beneath the oven is made use of for unloading. The larger parts are all put up in standard bundles; the smaller parts are dumped into boxes.

Cranes are provided to pick up the bundled parts and stack them into gondolas. The smaller parts are dumped directly into partitioned gondolas from which they are removed with a magnet at the assembly plants. This unit has a capacity of over 2000 completed sets of frame parts in 9 hours, with an average of 46 parts to the frame.

During the first quarter of 1928 the Cleveland plant of the Midland Steel Products Co. produced 129,620 frames as against 85,395 for the first quarter of 1927, exclusive of Ford. The efficiency of the new plant arrangement is indicated by the fact that for both quarters the payroll assignable to this production was $300,000.

Conference Speakers *Show* Growth of *Diesel* Engine Industry

By Roswell H. Ward

THE most representative Diesel power conference ever held in the United States was convened at Pennsylvania State College from June 14 to 16 under the auspices of the State College School of Engineering and the Oil and Gas Power Division of the American Society of Mechanical Engineers. Both in the scope of the topics discussed and the number of responsible executives present, the meeting set a record which has never been approached by previous sessions devoted to the discussion of Diesel power problems.

An address by Professor F. G. Hechler, director of the Penn State Engineering Experiment Station, was followed by a paper by Oliver F. Allen of the International General Electric Co., who outlined the impressive progress which the Diesel engine has made abroad. Mr. Allen especially emphasized the increasing use of the Diesel in mobile power applications and also called attention to the predominant position of the Diesel engine in marine circles and to the increasing trend toward the use of large Diesel engines in electric service central stations.

Use of Small Diesels

The "Economic Field for Small and Medium Size Diesel Engines" was outlined by Harlan A. Pratt of the Ingersoll-Rand Co. He laid particular stress on the use of Diesel engines of from 100 to 300 hp. in shovels, excavators, small Diesel-electric locomotives and the smaller types of pleasure and work boats. Papers on the field of application of the large Diesel and on relations between the Diesel engine industry and the public utilities were also read at this session by E. B. Pollister of the Busch-Sulzer Brothers-Diesel Engine Co. and by the author of the present article.

Of especial interest to the automotive industry is the trend toward cooperative research and similar coordinated activities as outlined by Harte Cooke of the McIntosh & Seymour Co., and Prof. P. H. Schweitzer, who is in charge of the Diesel fuel spray research conducted by the State College Engineering Experiment Station.

An elaborate equipment of spray injection apparatus has been assembled through the assistance of the Navy Department, the DeLaVergne Machine Co., The Bessemer Gas Engine Co. and others, and a very exhaustive program of investigation of fuel injection phenomena is being carried on.

At a symposium on "Specialization in Oil Engine Manufacture," papers were read by O. D. Treiber of the Treiber Diesel Engine Corp. and C. R. Alden, Chief Engineer of the Ex-Cell-O Tool Co.

Mr. Trieber indicated that the manufacture of various classes of Diesel engines has already become subject to a certain degree of specialization among individual engine builders and that this trend is likely to continue in view of the widely differing production facilities required to produce the radically divergent types of Diesel engine now on the market.

Improvement in the efficiency of fuel injection equipment and economy in production of this vital Diesel engine requisite were outlined by Mr. Alden. He illustrated the economies obtainable by an organization specializing in such work by various samples of pump plungers and parts produced for leading American manufacturers.

A message from overseas was brought by George Heath, of Carels, Ltd., who has just completed a trip around the world in the interests of his firm. Mr. Heath pointed out the wide extent of the application of Diesel engines in all parts of the world, citing installations in such remote regions as the Belgian Congo, Northern Poland, Shanghai, Australia, etc. He called attention to the present "established" character of the Diesel engine as a power producer and entered a plea for a uniform method of engine rating—again paying tribute to the cooperative practice found in the automotive and other industries.

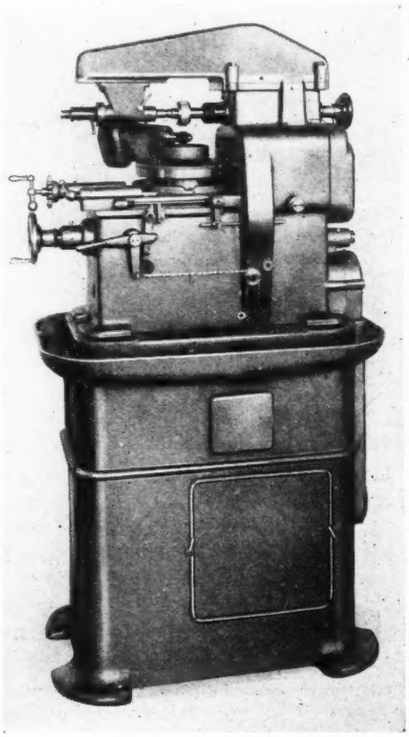
Uniformity in fuel oil specifications was discussed by G. H. Michler of the Standard Oil Co. of New Jersey and representatives of the U. S. Navy, the U. S. Shipping Board and others.

In the opinion of impartial observers of Diesel engine activities the meeting showed a tendency toward cooperation and better definition of trade policies which has long been anticipated in oil engine circles. Among the well-known engineers present were Alex Dow, past president of the A.S.M.E.; Dr. G. W. Lewis of the National Advisory Committee for Aeronautics, and numerous others.

NEW DEVELOPMENTS—Automotive

Mikron Gear Hobber

THE Mikron No. 102 gear hobbing machine is a recent development of Triplex Tool Co., New York, particularly adapted for such work as hobbing gear wheels and pinions for magnetos, speedometers, clocks and similar automotive parts. It has a capacity for spur and helical gears and pinions up to 5¼ in. diameter and 5½ in. long; numbers of teeth from 6 to 325 and with angles of spiral up to 70 deg., either left or right hand. Maximum pitch which can be hobbed is 12 D.P.



Mikron No. 102 hobbing machine for small gears and pinions

The machine is equipped with countershaft, pump and oil reservoir, cabinet base and complete tool equipment. Inclosed change gears are used for obtaining various divisions. Feed variations range from 0.004 to 0.030 in. per rev. The differential gearing consists of spur gears on parallel spindles mounted in a cylinder.

The swivel cutter head can be rotated through 180 deg. Micrometer dials are furnished as regular equipment. A special attachment is available by which bevel gears up to 3 in. diameter can be hobbed. The weight of the machine is about 600 lb. and it requires 2 by 3 ft. floor space.

Welder Has Gas Engine

THE Lincoln Electric Co., Cleveland, is marketing a new 300-amp. gasoline engine-driven electric welder known as the Model S-1964. The welding generator has a current range from 75 to 400 amp. for metallic electrode welding and is direct connected to a six-cylinder Buda Model HS-6 engine operating at 1500 r.p.m. The engine is rated at 27.3 hp. and gives 41 b.hp. at operating speed.

Both units are mounted on a welded steel base to give maximum rigidity with minimum weight. The

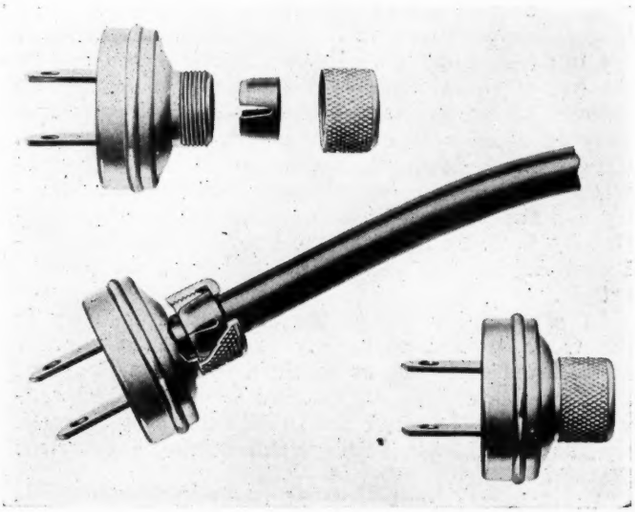
Lincoln Electric gasoline engine-powered electric welder

generator has the laminated magnetic circuit with separately excited field, stabilizer, variable voltage and steel construction features characteristic of all Lincoln Stable Arc welders.

Overall dimensions of the new equipment are 93 in. long by 35 in. wide by 48 in. high.

Cord Grip Plug Cap

AN unbreakable attachment plug cap with an improved type of cord grip is announced by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. The cord grip acts as a positive strain relief and is designed particularly to lessen short circuit hazards. The knurled collar wedges a fiber bushing tightly against the cord. A fiber grip bushing serves to insulate the cord from metal parts and results in less damage to the cord because it prevents contact between cord and metal. This bushing also acts as the clamp and is the only part that actually touches the cord.

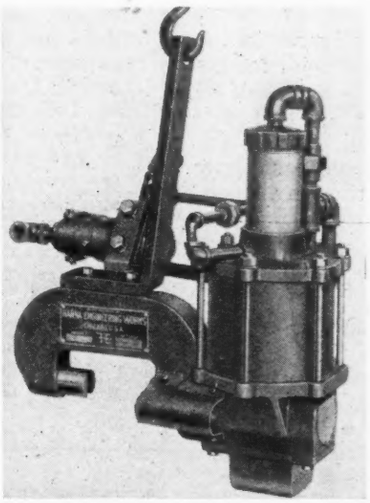


Dreadnaught cap with cord grip and strain relief

Parts, Accessories and Production Tools

Portable Pneumatic Press

A PORTABLE pneumatic press exerting eight tons pressure and weighing but 95 lb. has been developed by Hanna Engineering Works, Chicago. The press illustrated has a 2 in. depth of throat, 6 in. gap and ⅝ in. die stroke but the design is available in several sizes.



Hanna portable 8-ton press

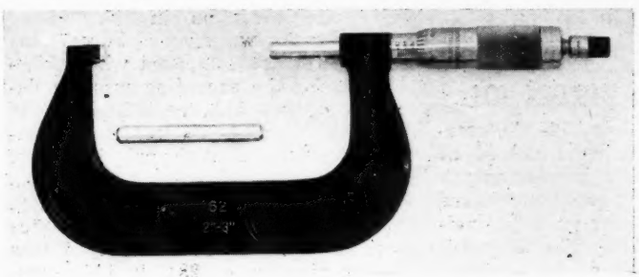
It is particularly adapted to pressing shackle springs into chassis frames as they pass along a conveyor line. The mechanism between the air piston and the die is of the roller and wedge type which provides a variable leverage in close conformity to the work to be done.

New Measuring Instruments

TWO new measuring instruments, a tubular inside micrometer and a micrometer caliper, have been developed by Brown & Sharpe Mfg. Co. The tubular micrometers are made in three sizes to measure from 12 to 22 in., from 22 to 32 in., and from 32 to 42 in. respectively, by thousandths. The range of measurements of each tool is obtained by 10 changeable anvils of different lengths, the shoulders of which fit against the shoulder of the micrometer head.

The anvils are changed easily and are held in place by a clamp screw fitting into a V groove. Being tubular, the tools are light and easy to handle. The measuring points are hardened and the faces ground on a radius to adapt them for measuring parallel or curved surfaces.

The two new calipers, Nos. 60 and 62, are similar to Nos. 61 and 63 except that they do not have clamp rings. They measure in thousandths, the first from 1 in. to 2, and the second from 2 to 3 in. Both have solid anvils and simple adjustment for wear of the measuring surfaces.



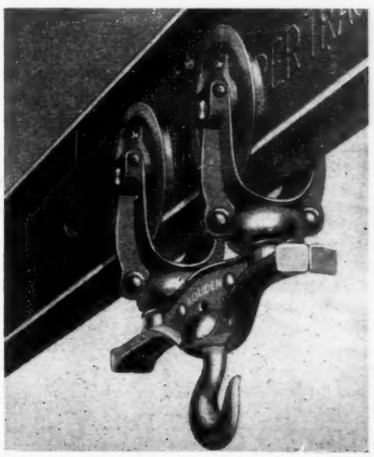
New B & S micrometer caliper

Altitude Indicator

THE Pioneer Instrument Co., of Brooklyn, has developed a new altimeter for indicating the height of air craft, the indicator of which is guaranteed to return to within 1/50 in. of zero upon returning to the ground from any height. This new instrument is a refined aneroid barometer with the dial graduated in units of height above the ground instead of in units of pressure. Its dial may be rotated so that any elevation above sea level or any barometric pressure may be taken as zero. It is made in four ranges, for altitudes of 10,000, 15,000, 20,000 and 30,000 ft.

Overhead Track Conveyor

THE Louden Machinery Co., Fairfield, Iowa, has brought out a new heavy duty, overhead track carrying system with a rated carrying capacity of 3000 lb. The track is a specially rolled I-beam approximately 6 in. deep with a 3-in. flange at the top and a 2-in. flange at the bottom. The material used is steel with carbon content of from .50 to .60. The track is available in straight lengths and curves, with switches, crossovers and all necessary fittings for any particular requirements.



Louden overhead trolley track

Model A-10 Unishear

THE Unishear Co., Inc., New York, has brought out a new model Unishear designated the A-10 which cuts cold rolled steel up to 10 gage at the rate of 10 ft. per min. The general design of the new machine is similar to other Unishears so that any lines can be followed and cut, whether straight, curved or irregular, and notches and angles can also be handled easily. The new machine is powered with a General Electric ¾ hp. motor and its net weight is about 165 lb.

THE ratio of losses paid on automobile risks to premium paid for insurance protection increased from 48.2 per cent in 1926 to 49.1 per cent last year.

AUTOMOTIVE NEWS SECTION INDUSTRIES
Philadelphia, Pennsylvania
July 14, 1928

Production in First Half Increases Over 1927 Total

PHILADELPHIA, July 14—With production of cars and trucks in the United States and Canada in June approximating 440,000, the total for the first half of the year has gone well beyond the total in the first half of 1927. This gain over last year will be much larger in the last half, primarily because Ford Motor Co. was completely out of production in the last half last year and is now operating at better than 3000 cars daily and is expected to continue at this rate or higher through the year.

Keener competition throughout the last half will probably be occasioned by the appearance of a considerable number of new models during July and August. Many cars which have enjoyed unusual sales records during the first half will be continued without change and will be compelled to meet the public interest in the newer models. The fact that the Ford Company is still several months behind on orders helps to limit competition in the low priced field but in price fields above this group the sales effort will be much keener.

The situation in the dealer field as the last half opens is generally improved over recent years with regards to both new and used car stocks. Factory cooperation with dealers in selling used cars has proved highly successful in the first half of the year and will be carried on with increasing vigor. Export shipments are generally at a higher rate than in any preceding year and promise to continue high throughout the year.

Motor Wheel Sales Increase 25 Per Cent

LANSING, July 10—Motor Wheel Corp. sales in the first six months this year will exceed $13,000,000 and will exceed the first half last year by about 25 per cent. Releases by Motor Wheel customers for July are reported exceptionally good, indicating that production is holding up strongly and that factory operations generally will be at a high seasonal rate.

Motor Wheel reports all of its Southern plants operating to capacity and it recently has opened up smaller emergency plants. Demand for its wheels and its pressed steel and stamping products has kept the company at capacity through almost all of the first half and many departments have been operating 24 hours daily. The wire wheel division is being pushed to capacity production.

A traveling 10-ton crane will be a feature of the new storage and assembly building, contracts for which were recent awarded.

G.M. Sales in 1928 1,700,000, Says Sloan

DETROIT, July 12—General Motors Corp. expects to sell approximately 1,700,000 motor vehicles throughout the world this year at a price approximating $2,000,000,000, Alfred P. Sloan, Jr., president, said yesterday addressing a luncheon given to overseas' delegates attending the International Advertising Association Convention. Sales in 1927 were 1,554,557. The luncheon was held in the General Motors Building.

Mr. Sloan said also that until the European of moderate means is able to buy a used car at a low price, automobile ownership per capita would not approach the per capita ownership in the United States.

C. F. Kettering, president of General Motors Research Corp., spoke on an Engineer's Viewpoint on Advertising.

The convention which closed tonight was attended by 3000 delegates representing nearly all countries of the world. The convention was featured by the staging of the first International Advertising Exposition.

Raskob to Direct Campaign

NEW YORK, July 12—John J. Raskob, chairman of the finance committee of General Motors Corp., was named this week chairman of the Democratic National Committee, in which capacity he will direct the presidential campaign of Governor Alfred E. Smith of New York. Mr. Raskob and Governor Smith have been personal friends for many years.

May Exports $49,021,401

WASHINGTON, July 13—Automotive exports in May were valued at $49,021,401, the second highest month the industry has had, being outranked only by March this year when the valuation was $49,954,163. The May figure represents a gain of 6.1 per cent over April and an increase of 15.9 per cent over May, last year.

Postal Receipts Drop Pending Lower Rates

WASHINGTON, July 12—Postal receipts at 50 selected cities for June, 1928, totaled $29,990,217 as compared with $29,681,229 during June, 1927, the Post Office Department announces. This is approximately 1.04 per cent increase and the comparatively small average increase in postal revenues is attributed by various postmasters as being due to action of large advertisers and other heavy mailers of withholding an immense amount of mail matter so as to take advantage of lower postal rates which went into effect July 1.

Road Builders to Hold Congress in Washington

PARIS, July 4 (*by mail*)—United at Chantilly, on June 30, the members of the Permanent Commission of the International Association of Road Congresses, accepted with acclamation the invitation of the United States Government to hold the next road congress at Washington the second week in October, 1930. This will be the first occasion the road congress has been held out of Europe.

The last congress was held in Milan in 1926. There is an assurance that about 1000 delegates will attend from European countries and many more from Latin-American countries. In addition to English, the official languages will be French, German and Spanish. Optional tours of interest to road engineers will be organized in connection with the congress.

During the Washington congress an exhibition of American road making and maintenance machinery will be organized.

Crude Oil Output Lower

NEW YORK, July 11—Average daily crude oil production in the United States for the week ended July 7 was 2,383,850 bbl. as compared with 2,384,150 bbl. for the preceding week, a decreases of 300 bbl., according to the American Petroleum Institute. Imports of petroleum at the principal ports for June averaged daily 237,534 bbl., compared with 226,388 bbl. in May. Imports at the principal United States ports for the week ended July 7 was a daily average of 284,142 bbl., compared with a daily average of 232,285 bbl. for the week ended June 30.

G.M. Retail Sales 1,062,713 in Half

Total Shows Increase of 222,232 Over 1927 Half—June Sales 206,259

NEW YORK, June 13—For the third consecutive month, sales of General Motors Corp. cars to consumers topped the 200,000 mark when June showed sales of 206,259 cars. This compares with 224,094 in May and 209,367 in April. These are the only months in which sales have topped the 200,000 mark. These sales also compare with 159,701 in June of last year, a gain of 29.2 per cent.

Division sales to dealers showed a marked let-up, registering 186,160 as compared with 207,325 in May and with 155,525 in June, 1927. This may be regarded as a seasonal let-up in production, and one contributing factor is the almost complete cessation of manufacturing by Buick during the month.

Retail sales in the first six months total 1,062,713 against 840,481 in the first six months last year. Division sales to dealers in the first-half totaled 1,083,316 against 883,477 in the 1927 first-half. Retail sales in the period increased 222,232 against an increase of 199,839 in the sales to dealers. The excess of division sales over retail sales in the 1928 half was 20,603 as against an excess of 42,996 last year.

The following tabulation shows monthly sales of General Motors cars by dealers to ultimate consumers and sales by the manufacturing divisions of General Motors to their dealers:

Dealers Sales to Users

	1928	1927
Jan.	107,278	81,010
Feb.	132,029	102,025
Mar.	183,706	146,275
Apr.	209,367	180,106
May	224,094	171,364
June	206,239	159,701

Divisions Sales to Dealers

	1928	1927
Jan.	125,181	99,367
Feb.	169,232	124,426
Mar.	197,821	161,910
Apr.	197,597	169,067
May	207,325	173,182
June	186,160	155,525

These figures include passenger cars and trucks sold in the United States, Dominion of Canada and overseas by the Chevrolet, Pontiac, Oldsmobile, Oakland, Buick, La Salle and Cadillac manufacturing divisions of General Motors.

Buys Instrument Company

NEW YORK, July 7—Manning, Maxwell & Moore, Inc., has purchased the American Schaeffer & Budenberg Corp. of Brooklyn, N. Y., and Worcester, Mass., from Ralph Jonas and associates. The newly acquired company, founded in 1851, is the oldest and one of the largest manufacturers of industrial instruments in the United States. The business of this company will be coordinated with that of the Consolidated Ashcroft Hancock Co., Inc., manufacturer of valves, indicating and recording instruments, owned by Manning, Maxwell and Moore, Inc.

Crossley Buses Now on British Market

LONDON, July 2 (*by mail*)—For the first time the Crossley Motor Co., with which Sir William Letts is intimately associated and which has confined its attention to passenger cars and light trucks until now, has entered the bus field and has produced a low-level chassis for 32-34 seated bodies.

The engine is a side valve type with cylinders cast in pairs and a bore and stroke of 4 5/16 x 5½ in., developing 70 b.hp. at 2250 r.p.m.; at 1000 r.p.m., the speed of maximum torque, the power is 48 b.hp. with an m.e.p. of 110 lb.

The driver's position is alongside the engine; a four-speed gearset is fitted with a 7 to 1 ratio in the underworm rear axle. The four-wheel braking is operated by a Dewandre vacuum servo. With a wheelbase of 16 ft. 7 in. and a body space of 21 ft., the chassis weighs 6500 lb., the tire equipment being 36 x 6 in. straight side Dunlops, twin at the rear.

Trindl Corporation Buys Diamond Piston Ring Co.

CHICAGO, July 10—The Trindl Corp. has purchased the entire equipment, plant and inventory of the Diamond Piston Ring Co. of Baltimore. The Trindl company has two plants in Chicago, manufacturing piston pins and bolts, and a plant at Racine where standard type valves are made. Diamond Piston Ring brings a complete line of compression rings, oil rings, piston balancer rings and inner rings to the Trindl line. Further expansion is underway.

Hupp Signs 66 Dealers

DETROIT, July 12—Hupp Motor Car Corp. signed contracts with 66 dealers in all parts of the country, during June. Dealers were located in 28 states and one Canadian province. The largest number were located in Massachusetts, Pennsylvania, New York, and Minnesota tie for second place, with Iowa and the Province of Ontario following in that order.

Fuller Signs Traffic Bill

BOSTON, July 9—Governor Fuller has signed a bill that promises to place Massachusetts as the first state to provide that all traffic signs, lights, marks and signal systems are to be uniform through its borders. This recommendation was made by the Governor's safety committee.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, July 11—Retail trade has shown some improvement during the past week. This is ascribed mainly to warm, dry weather, which has also aided the winter wheat harvest and crop growth in general. Most crops have had too much moisture rather than too little so far this season.

FREIGHT CAR LOADINGS

The movement of railway freight, however, gives no indication of any increase in the general volume of trade. Car loadings in the week ended June 23 numbered only 986,789, as against 1,003,292 in the preceding week and 1,018,060 in the corresponding period last year. Every classification of freight except forest products moved in smaller volume than a year ago.

BANK DEBITS

Commercial check payments, as measured by bank debits to individual accounts outside of New York City, were about 2 per cent larger during the week ended July 3 than in the similar period a year earlier.

FISHER'S INDEX

Commodity prices in general continue to advance slowly. Professor Fisher's index rose last week for the fourth successive time, and now stands at 98.8 per cent of the 1926 average, as against 98.4 last week and 97.6 four weeks ago.

FEDERAL RESERVE REPORT

The advance of stock prices is reflected in an upturn in brokers' borrowings. Loans of this type reported by Federal Reserve member banks in New York City increased from $4,159,000,000 to $4,307,000,000 during the week ended July 3. The monthly report of the New York Stock Exchange showed, as was expected, a large decrease of $376,000,000 in members' borrowings during June.

Loans of reporting member banks as a whole also rose sharply during the week ended July 3, the greater part of the gain being in loans secured by stocks and bonds. This gain was accompanied by an increase in borrowing from the Federal Reserve banks, discounts of the latter now standing at $1,191,000,000, as against $1,032,000,000 a week ago and $385,000,000 at the end of January. The ratio of reserves to deposit and note liabilities is lower than it has been since 1921.

INDUSTRIAL ACTIVITY

Industrial activity in most lines is seasonally quiet. An outstanding exception to the general trend is the building industry, which established new high records for June and for the half year in the matter of contracts awarded. The report of the U. S. Steel Corp. showed an increase of 200,000 tons in its unfillage tonnage in June.

Oakland Six Months Increases to 161,548

Business in First Half is 62% Higher than 1927—June Sales 30,245

PONTIAC, July 7—Registering a gain of more than 62 per cent over any previous six months in its history, Oakland Motor Car Co. for the half-year ended July 1, sold a total of 161,548 Oakland and Pontiac cars, W. R. Tracy, vice-president in charge of sales, reported. The six months record compares with shipment of 99,366 cars during the corresponding period in 1927.

Not only was this period the largest on record, but June also was the greatest month in Oakland history, with 30,245 cars sold, Mr. Tracy said. The figure for June this year compares with 20,080 cars last June. A record high day also was reached on June 30, Mr. Tracy said, when 1677 Pontiac and Oakland sixes went out to dealers.

As a result of the high performances of the company to date, Mr. Tracy stated that production up to July 1 was 60 per cent of the announced program of the company to build 270,000 units in 1928. The half-year volume was reached, he pointed out, despite temporary shut-downs in the Oakland plant incidental to moving machinery and assembly operations from the old factory to the modern centralized Oakland and Pontiac plants. Further centralization projects now under way, and the building of a new foundry unit will make possible still higher records in the future, Mr. Tracy stated.

Chevrolet to Expend $4,000,000 on Foundry

DETROIT, July 9—The Chevrolet Motor Co. has let contracts for a new gray iron foundry unit at Saginaw to cost approximately $4,000,000, of which about $700,000 will be spent for equipment and the balance for buildings. According to Arnold Lenz, general manager of the plant, it will have about 1700 tons melting capacity daily and is to be completed Dec. 1. In dividing the Saginaw Products Co., a division of General Motors, last September, Chevrolet acquired the gray iron foundry.

Studebaker Sales Gain 51%

NEW YORK, July 7—Studebaker Corp. of America sold 13,000 cars in June as compared with 8600 in June last year, an increase of 51 per cent, according to A. R. Erskine, president. Sales for the first six months of the current year approximate 75,000 as compared with 63,000 a year ago.

Trailer Assembly at Twin Cities

MINNEAPOLIS, July 10—Highway Trailer Co. has established Twin City headquarters and the first assembly plant between the two coasts. N. C. R. Jahn is branch manager.

North Carolina Bus Business Increases

CHARLOTTE, N. C., July 9—Gross revenues of motor bus lines operating in North Carolina totaled approximately $3,198,854 in the fiscal year ended June 30, according to R. O. Self, state bus commissioner. Passengers transported by these lines numbered approximately 3,000,000, or an increase of 1,000,000 passengers over the total for the preceding fiscal year. Taxes paid by the bus lines on revenues totaled $209,531 in the past fiscal year, as compared with $142,500 in the year ended June 30, 1927. The average increase in gross earnings of bus lines in this state in each of the past four years has been approximately 25 per cent compounded annually, the records indicated.

Chance Vought Shipments Gain 120% in First Half

LONG ISLAND CITY, N. Y., July 9—George W. Vought, president of Chance Vought Corp., reports shipments of Vought airplanes and parts during June were valued at over $260,000. This is a substantial increase over the May shipments, and is three times greater than for the corresponding period during 1927. Shipments for the first six months of 1928 showed an increase of 120 per cent over the same period of 1927. Orders on hand are in excess of $1,500,000, with several large contracts pending which will probably be closed during July, including some important contracts with South American republics.

Leo Shumatoff

NEW YORK, July 7—Leo Shumatoff, vice-president and secretary-treasurer of the Sikorsky Airplane Mfg. Co., dropped dead from a heart attack on Short Beach, L. I., July 4. He had been associated with Igor Sikorsky, airplane designer, for 10 years. He is survived by a widow and three children. Funeral services were held at ten o'clock this morning in the Russian church at Whitestone and burial took place at Mount Olivet Cemetery.

Herbert Lloyd

PHILADELPHIA, July 7—Herbert Lloyd, president of the Electric Storage Battery Co., died this week after a long illness. He was in his sixty-seventh year. Mr. Lloyd came to this country from Wales to do graduate work in chemistry. He was in charge of the laboratories of the Welsbach Light Co. and the United Gas Improvement Co. here, before he became head of the storage battery company 20 years ago.

Canadian Companies Lower Tire Prices

Reduction Brings Dominion Prices to Within 7½ to 10% of American Price

OTTAWA, July 9—Formal announcement was made by Canadian tire companies of a reduction in prices on automobile tires and other rubber goods, effective July 6, proportionate to the recent reductions in the United States, making retail tire prices in the Dominion almost equal to those in the U.S. despite varying market conditions.

A statement issued in behalf of one of the large Canadian companies contained the following:

The difference between American and Canadian prices in the popular sizes is now only 7½ to 10 per cent, which would make only a difference of 50 to 75 cents on a tire of popular size. In addition to this, the Canadian manufacturer is absorbing the sales tax. In the United States there is no such tax. Considering this and the enormous production in the United States as compared with that in Canada, the Canadian consumer is very fortunate in being able to purchase Canadian-made tires so cheaply.

"It is almost a certainty that there will be no further reduction in tires this year and the car owner will now be able to purchase the best made tire in the history of the industry at the lowest price in the history of the industry."

News of the tire price reduction in the United States some weeks ago, it was otherwise pointed out, had caused an easing off in the recent sales in Canada. Canadian motorists, having read of the drop in U. S. quotations, were sure that a similar reduction would be made in the Dominion before long and they therefore held off in their buying unless forced to procure new tires. There was an immediate jump in the tire business in Canada when the announcement finally came.

Liquidation of Stocks Unsettles Rubber Price

NEW YORK, July 9—Liquidation of stocks in both the London and New York markets caused some uneasiness in the crude rubber market during the early part of last week but the market closed the week with a firm undertone, according to F. R. Henderson Corp.

Arrivals in New York from July 1 to July 6 are estimated at 4800 tons.

London stocks further decreased during the week to a total of 38,611 tons.

Ceylon Cuts Rubber Duty

WASHINGTON, July 12—Export duty on rubber from Ceylon has been reduced from 4 rupees per 100 lb. to 2¼ rupees, according to a cablegram from Consul Mason Turner at Colombo to the Department of Commerce.

Carolinas Foresee Good Sales in Fall

First Half Sales Approximate 95 Per Cent of First Half Last Year

CHARLOTTE, N. C., July 7—The automotive trade of the two Carolinas, which centers at Charlotte, is forecasting now that the current year will have at its close a record about equal to the best in history, inasmuch as the record for the first half-year was approximately 95 per cent of the new-car sales total for the same period of last year. Seasonal influences and the anticipation by the public of the early arrival of new models in several popular lines are causing at this time a temporary subsidence in the demand for new cars. Most dealers are reporting large stocks of used cars.

The slowly accelerating operations of the Ford assembly plant here are another important factor in the improvement of the Carolinas' automotive trade. The numerous Ford dealers now are in a much better humor, after experiencing a rather lean year that ended a few weeks ago.

Records of freight traffic handled at Charlotte show 4938 carloads of automobiles and parts, gasoline and oil were received in the first half of the year, or approximately 10 per cent more than the total of carloads received in the same period of last year. All indications are favorable to the automotive trade for a good business in the fall. Retail and wholesale tire establishments are reporting a fairly good and increasing business, which began developing immediately after the recent reduction in prices of tires.

The continuing disposition of Carolina interests to make large investments in new construction is reflected in an average of approximately 450 sales of motor trucks each month in this state alone, according to reports obtained from motor truck distributors here.

South Carolina Licenses Reflect Increased Sales

COLUMBIA, S. C., July 7—While many South Carolinians are making direful predictions of the damage the boll weevil will do to the cotton crop this year, plenty of others are seeing their way clear to purchase automobiles as records at the licensing division of the South Carolina highway department show.

For the first six months of 1928, the amount of license fees collected totaled $2,276,605, while during the entire year of 1927, the total of license fees amounted to $2,168,708.

Two factors are credited with the increased receipts; one is the rigid enforcement of the law regarding motor license plates; the other is a trend towards cars of a higher price class.

Cadillac Card Widens Extension of Service

DETROIT, July 7—Cadillac Motor Car Co. is mailing to purchasers of Cadillac cars a card requiring all authorized Cadillac-La Salle service stations to accord the owner such service to which he would be entitled in the shop of the dealer from whom he bought. The purpose of the card system is to develop service to meet the needs of widely traveling vehicles rather than for stationary machinery. This service includes all the special attention which is given to a car in its first few thousand miles of travel.

Ford New York Branch Shows Town Brougham

NEW YORK, July 9—The local branch of Ford Motor Co. is displaying a chauffeur-driven all-weather town brougham. The body is mounted on a Model A chassis and is finished in dark maroon with red striping. Spare wheels are carried in wells in each front fender.

The chauffeur's compartment is upholstered in black leather and is separated from passengers by a sliding glass partition, in which there is an opening for communication. The passenger compartment is upholstered in twill and equipped with arm rests, arm pulls, silk curtains at the windows, electric light, foot stools, robe rail and built-in clock.

The price has not yet been decided.

Williams-Husky Agreement Only on Parts of Lines

BUFFALO, July 9—To clear up some prevailing misconceptions regarding its relations with the Husky Wrench Co., Milwaukee, J. H. Williams & Co., has pointed out the reciprocal agreement recently concluded between the companies is for sales purposes only, and covers the merchandising of only part of the entire line of each company.

Under the agreement Williams buys Husky socket wrenches from the Husky Wrench Co. and includes them in combination sets with its own chrome-molybdenum "Superrenches." The Husky company simply reverses this process. Williams makes about 40 patterns in 1000 sizes of carbon steel wrenches, but these are entirely outside the reciprocal sales arrangement.

Buick to Observe 25th Year

DETROIT, July 7—Buick Motor Co. will be host to officials of General Motors Corp. August 1, when it celebrates its twenty-fifth anniversary at Flint. An elaborate program has been prepared which includes a dinner by the Chamber of Commerce.

Brantingham Sells Implement Business

Will Specialize in Industrial Products Following Sale to Case

CHICAGO, July 7—Purchase of the farm implement division of the Emerson-Brantingham Corp. of Rockford, by the J. I. Case T. M. Co. of Racine, was announced officially today at the Rockford plant. The Emerson-Brantingham farm machinery plant at Rockford, with its farm machinery inventory at its works and branch offices, will pass into the hands of the Case company Aug. 1.

Emerson-Brantingham will retain its industrial products division and the transaction will enable the company practically to liquidate its entire indebtedness which includes $5,000,000 in debentures.

Case will employ all Emerson employees heretofore engaged in the farm machinery end of the business. The remainder will continue with the Emerson-Brantingham Corp. to carry on its industrial work, which new capital is expected to aid materially.

"By this change the E-B organization can give its undivided attention to the development of the industrial products division," said the official announcement. "It is confidently expected, based on contracts and orders now in hand, that the output of this department will be more than doubled within the next year."

The industrial products division was created a little more than a year ago and is devoted to the manufacture and sales of automobile parts, malleable castings, porcelain enameled and other metal products. It numbers among its customers some of the leading automobile and household equipment companies. Emerson also manufactures steel kitchen equipment. Operations have been limited because of insufficient capital.

N.A.P.A. Reports Increase of 17.5% in Five Months

DETROIT, July 9—National Automotive Parts Association reports sales of replacement parts for the first five months of 1928 show an increase of 17.5 per cent over the corresponding period of last year. "This average of gain over 1927 is encouraging," stated Charles H. Davis, executive secretary of N.A.P.A. "Although our total annual gain during 1927 was 19.1 per cent over 1926, this largely was realized by the volume during the summer months. If we are able to enjoy a relatively increased volume this summer, our particular group seems to be in a fair way to show an even larger percentage of increase in 1928."

According to the report the largest gains in replacement parts sales were realized in Mid-Western and Southern cities.

Men of the Industry and What They Are Doing

G.M. Export Executives Appointed to New Posts

E. C. Riley, managing director of General Motors Continental, Antwerp, returned to New York, July 3, for a business visit to the home office. Mr. Riley was accompanied by G. N. Van Sittart, sales manager of the same operation.

Wm. Harvey, Jr., general supply manager, sailed July 14 for London. Mr. Harvey will visit all of the European plants and expects to be gone about six months.

T. L. Hausmann, of the sales division, sailed July 7 en route to Bombay, where he will become sales manager of General Motors, India.

Walter Bylund, of the general manufacturing division, sailed July 14 on his way to Batavia via Europe. Mr. Bylund has been appointed assistant managing director of General Motors, Java.

Addison de Goll sailed from Seattle July 14 for Osaka where he will be attached as bus and truck specialist to General Motors Japan.

E. R. Tietz sailed from San Francisco July 11 for Melbourne, where he will be general inspector at General Motors Australia, Ltd., Mr. Tietz was formerly with the Chrysler Corp.

Roach with Mueller Brass

W. Roach is now associated with the Mueller Brass Co. of Port Huron, Mich., as assistant sales manager of the mill products division. For the past 10 years Mr. Roach has been with the American Brass Co., the last four of which he has been manager of the sales promotion department of the Buffalo branch. Previous to his 10 years' with American Brass, Mr. Roach was with Dodge Brothers.

Hutto on European Trip

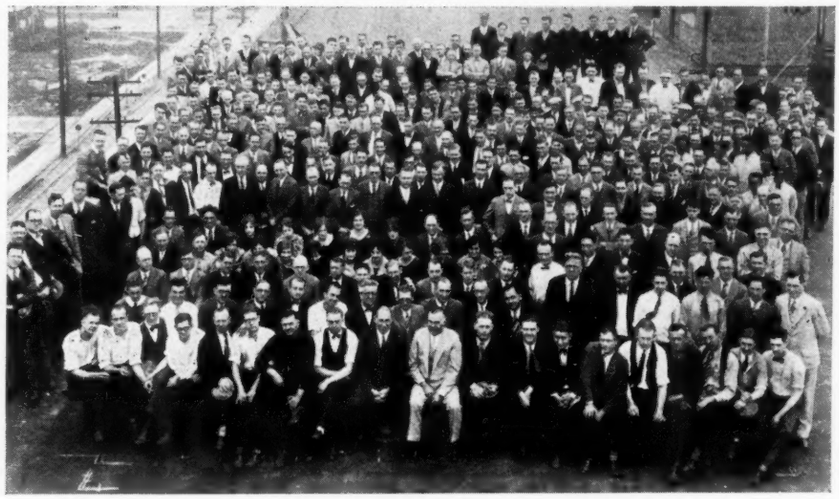
M. C. Hutto, president of the Hutto Engineering Co., has closed contracts with the United States Government for the grinding of cannon with Hutto equipment. Mr. Hutto has left the country for an extended trip to Europe.

Swanson on Leave of Absence

Verner J. Swanson, designer of the Powell lever engine, and for the past five years chief engineer of the A. L. Powell Power Co., Inc., Oak Park, Ill., is on a one-year leave of absence.

Marks to Visit Europe

To attend the Paris automobile salon and to study general automotive trends in Europe, E. S. Marks, chief engineer of the H. H. Franklin Mfg. Co. of Syracuse, will sail for Paris in September. Mr. Marks will visit automobile factories on the Continent, returning to London for the Olympia show. While there he will confer with M. C. Tetley, special factory representative on sales expansion work in Great Britain.



Chrysler Engineers at Opening of New Building

Members of the Chrysler Corp. engineering staff are here pictured at the opening of the new $1,000,000 engineering building. Walter P. Chrysler, president, and Fred M. Zeder, vice-president in charge of engineering, are shown in the center of the first row

Ford to Build Hungarian Road

Henry Ford has agreed to construct a macadamized road 125 miles long, from Budapest to Szegedin, Hungary, according to the Budapest "Financial Journal." The condition is that the Hungarian government allow his automobiles importation into Hungary duty free, so that they may be sold there for $400. This paper also says that the same agreement has been made with Bulgaria.

Hiscock Takes New Post

John H. Hiscock has joined Geare, Marston & Pilling, Inc., Philadelphia, as account executive. He formerly was with the Eugene McGuckin Co., Philadelphia, for nearly 13 years, and previously was identified with many merchandising successes in the automotive, accessory and hardware fields.

Austrians Develop Market

WASHINGTON, July 12—Austrian automobile and motorcycle plants are looking forward to a particularly active season in passenger automobiles and buses, according to cable advices received by the Department of Commerce. The Steyr Co., specializing in a light passenger car of the $1,400 class, is reported continuing to expand its domestic sales organization, and the Daimler plant, with a more expensive product and smaller output, is likewise reported rapidly developing the market for its product.

Vehicle Commissoners to Meet in Maryland

BALTIMORE, July 11—The Eastern Conference of Motor Vehicle Commissioners, representing 18 states, the District of Columbia and two Canadian provinces, will be held in Maryland on July 20 and 21. E. Austin Baughman, Maryland state motor vehicle commissioner, is president of the conference.

The visitors will meet in Baltimore on July 20 and organize their work. They then will be taken on a boat trip of the Baltimore harbor. In the afternoon they will be taken to Commissioner Baughman's home near Frederick, where they will be his guests. A business session will be held there at night.

On the second day there will be a business session in the morning and this will be followed by a tour of western Maryland.

Among the subjects to be considered by the members of the conference will be traffic, lighting problems, reciprocity, etc.

Georgia Licenses Pass 1927

ATLANTA, July 12—According to the Georgia motor vehicle department, revenue from the sale of automobile licenses in this state for the first six months of 1928 surpassed the entire total for 1927, making certain that in this respect 1928 will be the department's largest year. Total revenues collected to July 1 were $3,773,559 against $3,712,978 in all of 1927. For the first six months of 1927 the receipts amounted to $3,480,459.

Uniform Ordinance Mailed to Cities

All Important Features of Traffic Control Covered in Model Code

NEW YORK, July 11—The committee on Uniform Municipal Traffic Ordinances and Regulations, which met at Washington the last three days of last week, adopted a definite model ordinance which will be printed during the next 30 days and sent to cities throughout the country. A few of the important points of the model ordinance are listed below:

Traffic control of lights shall be on the three-light system with yellow light used after green only; vehicles passing others going in the same direction shall pass on the left only—some exceptions to this rule may be deemed advisable in the case of wide boulevards—this rule is deemed generally advisable; a car coming from the right shall have the right of way, except when the other car is already in the intersection; no turn shall be made on red lights; no unofficial signs are to be used on highways where they will block the view of official signs or traffic signals; there shall be no parking between the hours of 2 a. m. and 6. a. m.—this regulation is adopted to decrease the fire hazard and also to aid the police in checking up on stolen cars; railroads shall not be permitted to switch across highways so as to tie these highways up for more than five minutes; drivers will be permitted to back around a corner but will do so at their own risk and only where such a procedure is clearly safe; no attempt shall be made in this model code to define business or residential sections. An early suggestion that pedestrians be required to hold up the hand as a signal when crossing traffic was turned down as unpracticable.

Propose Traffic Commissions

As the appendices to this code there were drawn up suggested ordinances for the establishment of official traffic commissions and divisions of traffic engineering for cities of sufficient size to warrant such bodies. A suggested ordinance to prevent the blocking of highways and sidewalks is also included.

Representing the industry at this conference were William G. Metzger, vice-president Federal Motor Truck Co., who presided; David C. Fenner, chairman Motor Vehicle Conference Committee of the National Automobile Chamber of Commerce; J. Allen Davis, of the Automobile Club of Southern California; Colonel A. B. Barber; Fred H. Caley, of the Cleveland Automobile Club; W. W. Cloud, president of the Yellow Cab Co. of Baltimore; Howard Brown, attorney for the Detroit Automobile Club; Sidney J. Williams, public safety division of the National Safety Council; S. R. Heller, Yellow Cab Co. of Norfolk, Va., and John C. Long, of the N.A.C.C.

Herbert Hoover opened the session and at the close of the conference Mr. Cloud, who announced himself as a Democrat in politics, moved that a vote of thanks be extended to Mr. Hoover for his service in this work. The motion was unanimously adopted.

Packard Cuts Prices, to Offer New Line

DETROIT, July 9—Packard Motor Car Co. reduced prices on all its six-cylinder models today $300. Reductions have been made because the factory expects to announce new cars late in the summer which though identical in size and similar in appearance will have enough mechanical changes to classify them as new models. The new Packard Six prices follow:

126" Wheelbase Models

2-pass. runabout	$1,975
5-pass. sedan	$1,985
5-pass. phaeton	$1,975
2-pass. coupe	$2,050
2-pass. convertible coupe	$2,125

133" Wheelbase Models

7-pass touring	$2,185
4-pass. coupe	$2,385
5-pass. club sedan	$2,385
7-pass. sedan	$2,385
7-pass. sedan limousine	$2,485
2-pass. runabout	$2,085
5-pass. phaeton	$2,085

Transcontinental Air Lines Get Curtiss Falcon Plane

NEW YORK, July 7—Curtiss Aeroplane & Motor Co., Inc., recently completed and turned over to the newly formed Transcontinental Air Transport Co., a Falcon mail plane, similar to the army Falcon planes. The Transcontinental company has assigned the plane to Col. Charles A. Lindbergh, head of the technical committee, for his personal use.

The plane, which is powered with a 625 hp. Curtiss Conqueror water-cooled V-type engine, has a top speed of over 150 m.p.h. and a cruising speed of 135 m.p.h. It is fitted with a Curtiss-Reed propeller which holds the engine down to 1800 r.p.m. as opposed to a normal 2400 r.p.m at full throttle, thus increasing the engine life and reliability.

Takes Ottawa Steel Name

GRAND HAVEN, MICH., July 10—The names of the Detroit Piston Pin & Mfg. Co. has been changed to the Ottawa Steel Products Inc., and the capital stock has been increased from $25,000 to $50,000. New all-electric hardening equipment was installed in the new factory the company moved into last fall, and business has been steadily increased since. A 60-hour week has been in effect since January, this year, and a part force has been working nights on a 60-hour schedule.

Financial Notes

Pratt & Whitney Co., controlled by Niles-Bement-Pond Co. and controlling jointly with that company the Pratt & Whitney Aircraft Corp., has called for redemption on Dec. 31, 1928, at $100, its outstanding $1,916,500 in 6 per cent preferred stock. With the preferred stock redeemed the Pratt & Whitney Co. will have only 20,000 common shares of $100 par, owned entirely by the Niles-Bement-Pond Co.

Chrysler Corp. has called preferred Class A stock for redemption Aug. 6. The stock will be redeemed according to provisions of the certificate of incorporation at $115 a share and accrued dividends. Dividends will cease to accrue on that date. Holders of such shares are to present them on Aug. 6 at the principal office of the Central Union Trust Co. of New York and will receive checks for the redemption price.

Lakely Foundry & Machine Co. directors declared an extra cash dividend of 30 cents per share in addition to the regular quarterly dividend of 30 cents per share, payable July 30 to stockholders of record July 20. Sales for the first seven months of the fiscal year were nearly 40 per cent in excess of the same period last year.

USL Battery Corp. and the **Electric Auto-Lite Co.,** recently merged, report a pro forma balance sheet as of March 31 showing total assets of $19,538,475, with a surplus of $5,243,450. Current assets are $8,317,508 with current liabilities at $3,716,-901.

Continental Motors Corp. has declared the regular quarterly dividend of 20 cents per share, payable July 30 to stockholders of record July 15. With this dividend the company will have paid $1,056,-507 in 1928.

McCord Radiator & Mfg. Co. has declared quarterly debenture stock dividend of 50 cents and quarterly dividend of 1¼ per cent on Class A preferred stock, both payable July 2 to stockholders of record June 25.

Gibb Welding Machine Co. of Bay City, Michigan, manufacturer of arc, spot, seam and butt welders, has increased capital stock by $125,000.00, making a total of $250,000.00.

Eaton Axle & Spring Co. earnings for the first half of the year increased to $770,-955 before taxes, compared to $579,345 in the first half of 1927.

Warner Gear Co. has declared quarterly dividend of 25 cents and an extra dividend of 75 cents, both payable July 1 to holders of record June 20.

Collins & Aikman Corp. reports net profit for the three-month period ended May 31, after depreciation and Federal taxes, of $94,520.

G.E. Sells Finance Unit

NEW YORK, July 10—General Contract Purchase Corp., instalment financing subsidiary of General Electric Co., has been sold by the latter to the Industrial Acceptance Corp.

Nash Quarter Shows Profit of $2,768,473

Reduction Caused on Lowered Operations Before New Models, Says President

RACINE, July 10—Nash Motors Co. at a directors' meeting July 9 reported that for the second quarter of its fiscal year in 1928, covering the months of March, April and May, net income amounted to $2,768,473. This compares with $5,566,281 in the same quarter last year. The regular quarterly dividend of $1 per share was declared, and an extra dividend of 50 cents per share, payable on August 1, 1928, to stockholders of record July 20, 1928.

President C. W. Nash said the company's progress for the first six months of the year had been fully up to expectations. Though the earnings for the period were below those for the previous period in 1927; this resulted from the company's policy of discontinuing production of the older line well in advance of launching the new "400" series, so that dealers should not be left with old models on their hands.

Mr. Nash also said that the indications are that the company will make and sell more cars in July, August and September, 1928, than in any other like period in its history.

Durant Total Reduced by Early Year Delays

NEW YORK, July 10—More than 69,000 Durant motor cars have been produced and sold during the first six months of 1928, a gain of 48.9 per cent over the same period of 1927. A new line was announced in January, and in February production was held up by a shortage of material so the six-month total was piled up largely in four months. March showed a gain of 20 per cent over the best previous record, April exceeded that by 13.9 per cent, and May exceeded April by 13.5 per cent. The three months total exceeds the best previous three months by 57.5 per cent. Production for five months exceeds last year's total. A 52.4 per cent gain is shown in exports.

Auburn Ships 1500 in June

AUBURN, IND., July 11—Auburn Automobile Co. shipped 1500 cars during June, and the production schedule for July is 1700. Orders on phaeton sedans and cabriolets are far ahead of production, with no indication of catching up on these models for some time.

Dealers' stocks are still low and dealers are delivering cars as fast as they receive them. Production of two new models will be under way on Aug. 1: the seven-passenger sedan and the Victoria coupe. The seven-passenger sedan will be built on the 88 and 115 chassis and the Victoria will be built on all three chassis, the 76, 88 and 115.

Air Service Gains in Cadet Selection

WASHINGTON, July 12—More than one-fourth of the graduating class at West Point Military Academy have chosen aviation for their special field as army officers, it has been made known at the War Department. The graduating class this year numbered 261. Seventy-nine applied for detail with the Air Corps. Only three were rejected. In 1922, only 16 out of 132 graduates went to the Air Corps; in 1923, 51 of 261 went; in 1924, 61 out of 406; in 1925, 42 out of 245 graduates and in 1926 only 18 out of 306 elected to fly. Last year 30 out of a class of 203 went into the air corps.

April Aircraft Exports Exceed $250,000 in Value

WASHINGTON, July 12—The United States exported 14 aircraft valued at $113,015 to foreign countries during April, 1928, the Department of Commerce announces. Seven engines for aircraft valued at $49,804 and parts, excluding tires, valued at $81,313 were also exported.

Canada was the best customer, taking seven units valued at $61,252, while Mexico was second, taking four, valued at $21,650. The other three units were distributed between Hungary, Italy and Japan. Hungary got a bargain for $163, while Japan paid $20,000 for its unit.

The engines for aircraft were exported as follows: to Denmark, one, valued at $19,345; to Germany, two, valued at $11,856; to Canada, one, valued at $238; to Mexico, two, valued at $8,365 and to Japan, one, valued at $10,000. Canada bought more than half the value of parts, taking $46,723 worth, while Chile was the next best customer with $15,000.

Navy Buys Six Planes

WASHINGTON, July 12—Two contracts for purchase of airplanes have been completed by the Navy, according to an official statement of the Navy Department. Arrangements for the purchase of an experimental type of utility plane Model XJ-1, have been made with the Atlantic Aircraft Corp., New Jersey, at a cost of $13,779 and for purchase of five training planes at a total cost of $30,000 from the Consolidated Aircraft Co., of Buffalo. The utility plane will be an eight-passenger, single engine transport plane equipped with a Pratt-Whitney air-cooled engine.

British Market Steady

WASHINGTON, July 12—The British automobile industry during June continued steady with sales slightly lower toward the end of the month.

Associations Vote on Standards Plan

Reorganization of Committee as American Standards Association Proceeding

NEW YORK, July 9—Reorganization of the American Engineering Standards Committee, under the name of American Standards Association, has been approved by the main committee and is now being voted on by member bodies. This step is being taken in order to make the work of the committee more efficient and give it a more definite standing.

Trade associations interested in standardization will be able to join in the movement readily. A board of directors, consisting of 12 industrial executives, will be appointed for the concentration of administrative and financial responsibility.

The objects of the association, as stated in the new constitution, will be to provide systematic means by which organizations engaged in industrial standardization work may cooperate in establishing American standards in those fields in which engineering methods apply, thus avoiding duplication of work and the promulgation of conflicting standards; to serve as a clearing house for information on standardization work in the United States and foreign countries; to further the industrial standardization movement as a means of advancing the national economy, and to promote a knowledge of, and the use of, approved American industrial and engineering standards, both in the United States and in foreign countries; and to act as the authoritative channel in international cooperation in standardization work, except in those fields adequately provided for by existing international organizations.

Establish Coast Warehouse

CLEVELAND, July 10—Van Dorn Electric Tool Co. has established a complete warehousing and service depot at Oakland, Cal., to supplement the services of its sales and service branches in Los Angeles, San Francisco, Oakland and Seattle. All Pacific coast shipments will be made directly from this new warehouse, as a complete stock of the company's products will be maintained there.

Makes Steel Inner Tube

MINNEAPOLIS, July 10—Manufacture of steel inner tubes for tire casings has begun by the Reliable Airless Tire Corp., capitalized at $50,000. M. J. C. Nyborg, the inventor, is president of the company. The tube is hollow and made from a special type of steel, and will cost no more than the rubber tubes.

Automotive Orders Aid Steel Activity

Mill Operations Reported at High Seasonal Rate—Some Prices Irregular

NEW YORK, July 12—While steel mills catering to automotive consumers continue to operate at a rate that, compared with the usual July dullness, is gratifying, competition for orders appears to have turned keener. This is especially true of the strip-steel market. Cold-rolled material has dipped to the extent of $2 a ton. Prices for hot-rolled flats have become highly irregular.

Many mills have decided to ignore base prices and extras, as provided by the standard card, and to quote a net price on each specification, so as to avoid the shortcomings of the price structure still nominally in vogue. It has been discovered in some instances that after subtracting the card extra for specifications, the base price that remained was $5 a ton below the going price of steel bars.

While fresh demand for sheets is light, most mills appear to have a fair volume of orders on hand. Full-finished automobile sheets are holding firm at 4 cents, Pittsburgh. Announcement of further expansion of capacity is causing some uneasiness. The market for semifinished material is unchanged. Sheet rollers would like to see an equalization in the price of their semi-finished material and that used by competing strip-mills, the latter faring $1 per ton better on slabs than do the sheet mills on sheet-bars.

The recent $2 per ton reduction in the price of cold-finished steel bars does not seem to have quickened the flow of orders. Makers of hot-rolled bars insist that the recent advance to 1.90 cents will be adhered to in the booking of third-quarter business, but so far consumers appear to have ample supplies on hand, and are seemingly in no hurry to place third-quarter orders. Good-sized orders have been booked by bolt and nut manufacturers from automotive consumers. Automotive alloy steel manufacturers continue moderately busy.

Pig Iron—Automotive foundries are buying iron as they need it, or when attractive prices are named by sellers. Competition among blast furnace interests continues keen. While still irregular, the Valley market is slightly firmer. Lake furnaces continue to quote $17.50 for Michigan delivery.

Aluminum — Demand for virgin metal continues fair, and the market is quotably unchanged. Demand for pistons and automotive die-castings is good. Remelt No. 12 alloy has been marked down ½ cent per pound, but otherwise the secondary market remains unaltered.

Copper—While consumers have bought some copper for July delivery, domestic demand is rather quiet.

Tin—The tin market has turned dull. Consumers have been more frightened by the recent wide price-swings than attracted by the relative cheapness of the metal.

Lead—The market presents routine conditins, with storage battery manufacturers showing little interest in offerings.

Zinc—The market is firm, but only moderately active.

Europe's 27,000,000 Bicyclists Seen Potential Car Buyers by Grant

DETROIT, July 7—"Despite the desire of European automobile manufacturers to keep the business to themselves and regardless of the wish of European motor car buyers to support home industries, I feel that the great value of the American automobile at its price will break down those sentimental barriers and provide American manufacturers with a steadily expanding market abroad," said R. H. Grant, vice-president in charge of sales of Chevrolet Motor Co., who recently returned from a six weeks' tour of the leading business centers overseas.

"America's position in the European market has been made possible and fortified by the advanced production methods employed by the industry on this side of the Atlantic," Mr. Grant pointed out. "Our manufacturing facilities are vastly superior to those of European companies.

"This is true especially in the lower priced fields where Europe has only one manufacturer that has developed quantity production methods to any considerable extent. And as we know over here, volume manufacturing has been one of the foremost factors in permitting the industry to offer so much automobile at so low a price."

Mr. Grant is keenly enthusiastic over the prospects for export sales and points to an increasing European trade as an important factor in the development of the automobile business generally.

"Unlike the average American, the typical European hasn't yet come to the realization that he must have an automobile," Mr. Grant observed. "However the desire to own one has always been there and with economic conditions in better shape now than at any time since the war, the prospective customer over there is in a more advantageous position to satisfy the need."

The wide-spread use of bicycles throughout Europe proved of special interest to Mr. Grant, as a seller of a low-priced car. There are 20 bicycles in operation in Germany for every automobile registered, 10 in England and seven in France. More than 27,000,000 bicycles are being operated in these countries alone.

"The vast number of bicycles now being used in Europe provides an accurate notion of the potentialities of the European automobile market and seems to indicate that one of the major sales duties of the automobile industry abroad is to place these 27,000,000 bicycle riders at the wheels of automobiles," Mr. Grant declared.

In the course of his tour Mr. Grant visited England, France, Belgium, Germany, Holland and Denmark. In Antwerp, Berlin, Copenhagen, Paris and London, he addressed meetings of Chevrolet dealers.

Hutto Expands Plant

DETROIT, July 10—The Hutto Engineering Co., Inc., has increased the size of its plant three times in four years. The addition now going up will have facilities for the production of cylinder grinders of a capacity from ⅞ inch to 28 inches for automotive and other uses. The present addition includes space for a complete paint spraying plant, to be used in finishing the Hutto grinder stands, recently introduced.

Hood Light Patentable

WASHINGTON, July 12—Rejecting an adverse decision by the examiner, the Board of Appeals of the Patent Office has awarded a patent for an illuminating device for automobile hoods, to provide a light when the hood is lifted. The patent was awarded to Herbert J. Goldthwaite on an application filed Feb. 21, 1924.

N.A.C.C. Representative Reports on Far East Market

NEW YORK, July 3—Walton P. Schmidt, field representative of the National Automobile Chamber of Commerce, who has been addressing English speaking peoples in the Far East, reports from Manchuria on trade conditions there.

A large percentage of the cars in the leading cities of Harbin, Dairen and Mukden are taxis, while another larger portion are owned by government and military officials. These latter cars not being subject to any form of regulation, registration or taxation, there is no accurate check on number.

Sales in Harbin are expected to be 50 per cent in advance of last year. Dealers in this country report that they cannot get sufficient regular service work to pay for developing that end of the business. Most of the car owners hire drivers and the drivers are expected to put in their idle time in keeping the cars in condition. Consequently the cars in condition.

About 90 per cent of the sales of this country are on a time basis, with promissory notes, dealers usually handling their own financing.

Conference Approves Lift Truck Standards

Dimensions and Terminology Will Become Effective Oct. 1, 1928, Under Plan

WASHINGTON, July 11—A general conference of manufacturers and users of skid platforms and lift trucks, hand and power, held June 28 at the Department of Commerce, under the auspices of the division of simplified practice, approved a proposed simplified practice recommendation for the dimensions of lift trucks and skid platforms.

The conference passed resolutions that two standard dimensions, 8 in. and 12 in., be adopted for under clearance of skid platforms; and that "the minimum clearance between runners or supports of skids be not less than 29 in." In addition the conference went on record as favoring the establishment of standard dimensions for overall length and width of skid platforms, with the proviso that there be two standards, one to be such that this size of skid can be placed three abreast in a freight car, and the other the same length as the first skid but twice the width.

The conference agreed on a standard terminology for skid platforms as follows: Skid platforms—a platform of given size which is mounted on skids or legs, and which can be easily moved from place to place. Skid stock boxes—a platform of given size, which has closed sides and ends, forming the shape of a box and which is mounted on skids or legs, so that the same can be easily moved from place to place. Hand lift truck—a 3 or 4-wheel truck, the upper platform of which is adjustable to different heights, this adjustment being made by hand and the truck propelled by hand power. Power lift truck—a 3, 4 or 6-wheel truck, the platform of which is raised or lowered by power, and the truck and load it carries propelled by power.

Review Standards Yearly

This recommendation, subject to acceptance on the part of the interested elements of the industry, will become effective Oct. 1, 1928. It will be reviewed annually by the standing committee. The membership of this committee is comprised of Robert A. Lesher (chairman); J. W. Gerber of the Southern Railway, N. C. Damon of the National Automobile Chamber of Commerce, C. B. Crockett of the Society for Electric Development, W. A. Meddick of the Lakewood Engineering Co., Walter C. Stuebing of the Stuebing Cowan Co., and Edwards L. Leeds, of Leeds, Tozzer & Co.

R. L. Lockwood, who represented the division of simplified practice at the conference, stated that the industry would be circularized within the near future for signed acceptances to the recommendation.

Rubber for Paving Proposed in England

WASHINGTON, July 12—A movement to popularize rubber for paving blocks has been set on foot in Great Britain by Sir Stanley Bois, former president of the Rubber Growers' Association, and chairman of many producing companies, who has announced the formation of Universal Rubber Paviors, Ltd., with a capital of £105,000 according to a consular report to the Department of Commerce from London.

Motorcycle Census Shows 16% Increase

WASHINGTON, July 12—An increase of 16 per cent over the preceding year is revealed in the world census of registration of motorcycles throughout the world on Jan. 1, 1928, according to the Department of Commerce. On Jan. 1 last there were 1,944,303 motorcycles in operation throughout the world as compared with 1,674,720 a year earlier. Great Britain and Germany continue to lead the world, having more than 1,000,000 between them. In Great Britain registrations jumped 11 per cent to give the United Kingdom 693,213 on Jan. 1, 1928, or more than one-third of the world total. Germany showed a 46 per cent gain from 278,000 on to 405,000. The United States has only 124,359 machines. France has 158,000; Australia, 84,663; Italy, 53,500; Asia, 53,839, and Africa, 52,499.

Hardwood Buying Shows Increase Over June Rate

ATLANTA, July 12—Demand for southern hardwoods from the automobile and body manufacturing industries during the last week of June and the first week of July was considerably better than the average business in June. A sizable volume of business is being placed for delivery during August and September. Prices are gathering strength all through the list of automotive hardwoods, and there appears to be little prospect of any declines in the near future.

German Profits Small

WASHINGTON, July 12—Advices to the Department of Commerce from Germany indicate that a number of German automobile manufacturers will show little, if any, profits during the current period. From statements already issued, it is reported the Stoewer Co. of Stettin has again passed dividends although it showed a small net profit. No dividends of the Hansa Automobile Co. of Varel were declared. Even the larger companies are experiencing difficulties, according to the reports.

Maryland Registers Factory Shipments

Law Passed Last November Shows Dealers Received 950 Cars Weekly

BALTIMORE, July 11—An average of about 950 cars have been received from the factories by the dealers in Maryland each week from Nov. 1, 1927, to July 10, 1928. The total is 34,195. Under the provisions of a law which became effective on Nov. 1 last the Maryland dealers must register the new cars received with the offices of the state motor vehicle commissioner. No charge is made for this registration, however, the charge being made to the purchaser of the car when the vehicle is sold.

The commissioner's office has just completed compiling the statistics for the first six months of this year and these figures offer some interesting comparisons with the first six months of 1927. Total registrations for the first half of this year show an increase of 23,914 over the corresponding period of last year. For this year the total was 283,024 as compared with 259,110 for the first six months of 1927.

The records kept by the Maryland office divides motor cars as to the type of tires used—pneumatic and solid—rather than under the headings of passenger cars and trucks. In the first six months of this year the office registered 262,376 pneumatic tire cars. In the same period of last year this total was 235,071, the increase this year being 27,305. Solid tire registrations, however, showed a decrease from 9927 to 8938. Hiring car licenses decreased from 4391 to 3088 and dealers' licenses dropped from 6383 to 5422. Trailers showed an increase from 547 to 596 and tractors increased from 94 to 96. There was a further decline in the number of motorcycles registered, the figures being 2005 in the first six months of last year and 1825 during the corresponding period of 1928. Motorcycle dealers' licenses decreased from 60 to 56, licenses for motor wheels increased from 52 to 57 and bus licenses declined from 580 to 570.

Repeat Machine Tool Show

CINCINNATI, July 10—The National Machine Tool Builders Association decided at its spring convention to hold another exposition in the fall of 1929. The president appointed the following committee to organize and conduct the exposition: Chairman, J. Wallace Carrell, vice-president and general manager; Lodge & Shipley Machine Tool Co.; Henry Buker, vice-president, Brown & Sharpe Mfg. Co.; R. E. Flanders, manager, Jones & Lamson Machine Co.; Robert M. Gaylord, vice-president Ingersoll Milling Machine Co.; James E. Gleason, president and general manager, Gleason Works.

G.M. Appoints Staff for Warsaw Factory

Plant to Build 10 Chevrolets Daily at Outset—Employs Local Labor

NEW YORK, July 9—The establishment of General Motors Polsce SP ZO.O, at Warsaw, Poland, is announced by the General Motors Export Co., as the latest addition to the chain of 21 subsidiary operations. During the past six years Poland has been served by General Motors International at Copenhagen—General Motors' first overseas assembly plant.

W. L. Pavlovski, formerly manager of the London Branch office in charge of Vauxhall, has been named managing director of the new operation. Mr. Pavlovski has previously been in business in Warsaw and Danzig.

The plant's output will be approximately ten units per day and will be confined to Chevrolet touring cars, sedans, commercial and truck chasses. Production is expected to begin next month and the plant will be operated exclusively by local labor.

In addition to Mr. Pavlovski as managing director, the executive staff includes O. K. Winding, sales manager; J. H. Johansen, supply manager; J. Pawloski, production manager; C. J. Yavorski, sales department; Stanley Mayka, paint shop foreman; A. Andersen and G. Borgquist as treasurer and assistant treasurer respectively.

Offers New Wolverine

LANSING, July 11—The addition of a five-passenger four-door sedan to replace the landau sedan, features the announcement of the 1929 Reo Wolverine. A narrower radiator, more gracefully rounded hood, and deep color panels below the door windows add to the improved appearance. Bumpers front and rear and hydraulic shock absorbers on the front springs are included in the equipment.

Plan Mexican Road Show

WASHINGTON, July 12—The second National Highway Congress and Exposition of Mexico will convene in Mexico City Oct. 3 and continue through Oct. 6, it is announced by the American Road Builders Association. The road builders' association, with headquarters in this city, is cooperating with the Mexican National Highway Commission in arranging the exposition which is to be divided into three sections. Engineers and officials will exhibit charts and specifications demonstrating road construction and maintenance; contractors will exhibit motion pictures and distribute matter pertaining to their phase of road work and manufacturers will have an elaborate display of road building machinery and equipment.

Ford Now Shipping Car With New Brake

DETROIT, July .11—Ford cars are now being delivered embody a separate set of internal brakes operating on the rear wheel drums. This is contrary to rumors which have beeen current for some time to the effect that Ford would incorporate a driveshaft type parking brake in the Model A car.

The new brakes, it is understood, are smaller in diameter than the rear wheel service brakes and are placed concentric with and to the outside of them, operating on the same drums. The drums formerly flared to the brake diameter and they now have two brake surfaces side by side.

U. S. Air Transport, Inc., Takes Over Two Lines

NEW YORK, July 11—United States Air Transport, Inc., has been chartered under the statutes of Delaware to take over the operating companies—Seaboard Airways, Inc., and Capital Airways, Inc.

The Seaboard company is now operating passenger service between New York and Washington with four Ryan brougham planes, carrying four passengers and 200 pounds of express. Capital Airways is making plans for passenger service between New York, Philadelphia and Atlantic City.

Sales in Louisville Gain 25% in June

Business for Half Year Totals 4704—Used Cars in Demand

LOUISVILLE, KY., July 7—June like every month of the 1928 season continued to show a gain in new car sales as compared with the 1927 season, the June gain being about 25 per cent, with 837 new cars sold in Louisville and Jefferson county, as compared with 668 last year. In May 1034 cars were sold as against 807 in May of last year. For the half year 4704 cars have been sold as against 3930 in the half last year. June also showed 101 trucks sold. Used cars have been moving very well.

Sales for June included the following: Auburn, 4; Buick, 26; Cadillac, 5; Chandler, 3; Chevrolet, 334; Chrysler, 36; Dodge, 28; Durant, 33; Erksine, 7; Essex, 54; Falcon-Knight, 1; Ford, 129; Gardner, 2; Graham-Paige, 34; Hudson, 9; Hupmobile, 16; La Salle, 7; Marmon, 4; Nash, 12; Oakland, 10; Oldsmobile, 29; Whippet, 40; Packard, 13; Peerless, 1; Pierce-Arrow, 3; Pontiac, 59; Reo, 11; Studebaker, 20; Willys-Knight, 7.

Durant French Company Formed

PARIS, July 4 (*by mail*)—A Societe Anonyme des Automobiles Durant has just been formed under the French company laws as the result of a recent visit of W. C. Durant to Paris. The sales organization is at present in the hands of the Paris Garage, Rue de Vaugirard, but elaborate showrooms will be opened in the Avenue des Champs Elysees, opposite the Claridge Hotel, during the fall.

20 Per Cent Increase in Registrations Seen in Germany and Holland in 1928

NEW YORK, July 7—D. G. Ruarus, European representative for E. A. Laboratories, Inc., Blackhawk Mfg. Co., Kilborn-Sauer Co. and Automatic Devices Inc., has been in this country for the last week or two visiting his home offices and making tentative arrangements for the introduction to this market of a German manufactured traffic signal for attachment to automobiles.

Mr. Ruarus, whose home is in Amsterdam but who covers the whole of Continental Europe and Great Britain for the lines he handles, reports varying conditions in Europe. Generally speaking, European industry is making rapid strides at present, although there are exceptions. The automotive industry is perhaps not as good as it might be and is materially retarded in most countries by high taxes, not only on cars themselves but general taxes and taxes on gasoline.

The Netherlands, with a present car registration of 75,000, will probably increase this registration during the current year by 15,000 to 16,000, while Germany in all probability will make a similar increase of about 20 per cent. Domestic car manufacturers in a number of European countries are building up production to a basis which is beginning to be comparable with some of the plants in this country, but none of them have yet approached the production efficiency of our larger plants.

The sale of automotive equipment in England is materially hampered by the British propensity to purchase British-made goods. This is true, however, more of original equipment than of replacements, many American products commanding a high replacement market on account of their superior quality. Individuals in other countries are not so markedly prejudiced, although American products are frequently held back by high import duties.

Mr. Ruarus returns to Holland today on the Holland-American liner, Nieuw Amsterdam.

4-Cylinder Cars Win Bugatti Grand Prix

PARIS, June 26 (*by mail*)—André Dubonnet, French sportsman, won the Bugatti Grand Prix at Le Mans, Sunday, by covering a distance of 171½ miles in 2 hrs. 13 min. 11 sec., or at an average of 77.2 m.p.h.

This was the first race in Europe for cars of one particular make, and was originated by Ettore Bugatti, who offered three automobiles as prizes. In order to put the different models on an equality, the race was run in heats and a final handicap, based on the theoretical speed possibilities of the different cars. This handicap gave an advantage to the 91½ in. non-supercharged four-cylinder models, which won first three places, for it was possible to modify these to give much higher speed than was obtainable from the normal models, whereas the bigger supercharged engines did not allow of much increase in power. Engine speeds were increased from 4000 to 5000 revolutions, supplementary oiling systems were fitted, oil radiators were used, the compression ratio was increased, and Elcosine, which is a mixture of alcohol, benzol and ether, was used in place of straight gas.

During the elimination trials Blancas, a Belgian driver on a 140 in. Bugatti, covered a lap of the circuit in 6 min. 50 sec., or at 94 miles an hour, thus breaking for the first time the record set up by the late Jimmy Murphy, on a 183 in. Duesenberg, in 1921, of 7 min. 43 sec., or 83.4 miles.

Kissel Exports Double in 1928

HARTFORD, WIS., July 7—Kissel Motor Car Co. reports export business more than doubled for the first six months of this year, compared to the same period last year. Many new distributors have been added by the company in the United States.

Coming Feature Issue of Chilton Class Journal Publications

Oct. 10—Marketing Annual for 1929—Motor World Wholesale.

Keech Finishes First at Rockingham Speedway

SALEM, N. H., July 7—Ray Keech, holder of the world's straightaway record of more than 207 miles an hour, was the winner of the 200-mile race here July 4 on the Rockingham Speedway. The race was stopped by rain at 15 miles, and then started again for 185 miles more. Keech's time for the latter distance was 1 hour, 30 minutes, 26.50 seconds. Louis Meyer, winner of the 500-mile race at Indianapolis this year, finished second, two seconds behind Keech, and Norman Batten was third, very close to Meyer. The others to finish in the money were Dave Evans, Bill Spence, Bob McDonough, Leon Duray, Earl Devore, Fred Comer and Cliff Woodbury in that order. The drivers divided $20,000, of which $7,000 went to the winner. There were about 40,000 present. Cliff Bergere took a slide off the track just about where Harry Hartz was injured last fall, but he was not hurt. This was the first time Keech and Meyer ever drove on a board speedway.

C.I.T. Opens New Branches

NEW YORK, July 9—Commercial Investment Trust Corp. has opened branch offices, through its subsidiary, the C.I.T. Corp., in Portland, Me., and Binghamton, N. Y., to serve car dealers and distributors in the surrounding territories. The company now has 70 complete branches in North America, six of these having been added during the month of June.

Kansas Faces Loss of Federal Road Aid

KANSAS CITY, July 7—Kansas is facing the loss of $2,000,000 Federal Aid for road purposes and only a special session of the legislature and the approval by the voters of a constitutional amendment can save the appropriation. William M. Jardine, secretary of agriculture and a Kansan, has notified Governor Paulen that no more money will be given the state for road purposes until the state has amended its constitution so that control of the Federal and state roads money is in the hands of a state highway commission.

Under the present law most of the money collected for road purposes by the state—gasoline tax and motor license fees—goes back to the counties from which it is derived, with the state highway department having something of a veto power over the expenditure. Governor Paulen is asking the members of the legislature to agree to vote for submission of a constitutional amendment before calling the extra session. He also is opposed to increasing the state gasoline tax, a move that has been suggested.

Checker Cab Closes Contracts

KALAMAZOO, July 9—Checker Cab Mfg. Co. has closed contracts which insure the running of its plants at 80 per cent capacity and earnings of 75 cents a share, for the next three months, Jacques Moos, a director, reports. The company is expected to put its shares on a dividend basis later in the year.

Safe-T-Stat to Add Unit

TOLEDO, July, 9—Safe-T-Stat Co., which recently took over W. G. Nager Electric Co. here and is moving its entire plant to Toledo from Brooklyn, today let a contract for a $150,000 addition providing 24,000 sq. ft. additional space.

Calendar of Coming Events

SHOWS

American Electric Railway Ass'n, Public Auditorium, Cleveland..Sept. 22-28
American Road Builders Association, Inc., Cleveland Auditorium..Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-12
American Welding Society, Commercial Museum, Philadelphia.....Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Berlin .....Nov. 8-18
Brussels .....Dec. 8-19
*Chicago, National, Coliseum, Jan. 26-Feb. 2
Leipzig .....Aug. 26-Sept. 1
London, passenger cars .....Oct. 11-20
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York, National, Grand Central Palace .....Jan. 5-12
Paris, passenger cars .....Oct. 4-14
Paris, trucks .....Nov. 15-25
Prague .....Sept. 1-9
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 9-16
Salon, Automobile Salon, Inc., Hotel Commodore, New York .....Dec. 2-8

*** Will have special shop equipment exhibit.**

Salon, Automobile Salon, Inc., Palace Hotel, San Francisco...Feb. 23-Mar. 2

CONVENTIONS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Gear Manufacturers Association, Statler Hotel, Buffalo, N. Y., Oct. 11-13
American Road Builders Ass'n, Inc., Cleveland Auditorium .....Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-12
American Welding Society, Commercial Museum, Philadelphia.....Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Institute of Mining and Metallurgical Engineering, Benjamin Franklin Hotel .....Oct. 8-12
National Association of Automobile Show and Association Managers, Before-Shows, Drake Hotel, Chicago .....July 26-27
National Highway Congress, Mexico City .....Oct. 3-6
National Safety Council, National Congress, New York .....Oct. 1-5
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3
Society of Industrial Engineers, Rochester, N. Y. .....Oct. 17-19
World Motor Transport Congress, Rome .....Sept. 25-29

A. S. M. E.

Cincinnati, Oct. 22-25 — Machine Shop Practice.
Cleveland, Sept. 17-20—Fuels.

S. A. E. National

Chicago, Dec. 6-7—Aeronautic.
Detroit, Book-Cadillac, Nov. 22-23—Production.
Detroit, Book-Cadillac, Jan. 15-18—Annual.
Los Angeles, Sept. 13-14—Aeronautic.
Newark, Robert Treat Hotel, Oct. 16-18—Transportation.
New York, Hotel Astor—Jan. 10—Annual Dinner.

RACES

Spain .....July 29
Belgium .....Aug. 12
Altoona .....Aug. 18
Syracuse .....Sept. 1
Italy .....Sept. 2
Salem .....Sept. 8 or 15
Great Britain .....Sept. 22